



SATURDAY, SEPTEMBER 18, 1875.

Contributions.

On the Strains Produced in Fire-Box Plates by Alternate Heating and Cooling.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The apparent contradiction in the results of the experiments made upon two different pieces of steel boiler plate, by Mr. Hayes and Mr. Peddle, to which you alluded in an editorial in the *Railroad Gazette* of May 29, might, it seems to me, be susceptible of explanation; and although the results in the one case seem to have been directly the opposite of the other, yet both result mainly from shrinkage of the metal after being heated, but under different conditions and circumstances. In the case reported by Mr. Hayes, a plate $9\frac{1}{2}$ inches square was heated to a cherry red, and cooled off suddenly. This being repeated six times, it was found that a permanent change in the length of the four sides of the square, immediately along the edges, had taken place to the extent of 3-16 of an inch, or 1-52 part of the original length; that the sides of the square had shortened by heating and cooling, while the metal across the center of the square, under this treatment, retained its original length. For simplicity we will consider the effect of the treatment upon one side of the square only, as all sides of the square under the same treatment will give like results.

Fig. 1.

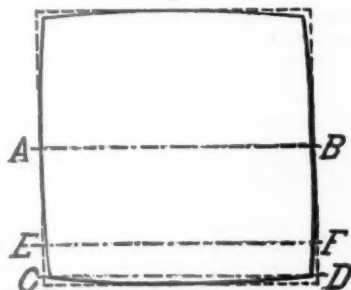


Fig. 1 will illustrate: The dotted lines represent the original shape of the square sheet, and the dark lines the shape after the treatment referred to. What, then, has occurred to the metal along the side CD that it has lost some of its original length?

If a square sheet, such as this was originally, is heated to a degree of redness, and while in that condition a band of the same metal and heated to the same degree be placed around the entire sheet, fitting perfectly all along the edge, and this band be suddenly cooled while the metal in the sheet is still hot enough to be easily compressed, it will be found that the contraction of the metal in this band along CD has permanently shortened the edge of the sheet through the line EF ; for the reason that the metal in the sheet, at that temperature, has but little elasticity, but is extremely pliable, and the sudden shortening of this band in the direction of CD as it cooled, compressed, thickened and shortened the side of the square sheet along EF .

Now if the sheet is cooled off, it will be found that this band, which, by being suddenly cooled first, compressed and shortened the sheet through EF , will, when band and sheet are cold alike, has become loose, and will be as much too large to fit the sheet as the sheet was permanently shortened along CD by the shrinkage of the band in the first instance.

If the sheet is again heated and a perfect-fitting heated band placed around the edge as before, and this band cooled off while the sheet is hot, the same results follow as in the first instance, and the sheet along CD and EF is again permanently shortened. So at each heating and cooling, like treatment producing like results.

In the case of the experiments made by Mr. Hayes, no band placed around the edge of this square sheet was made use of in producing the force necessary to permanently shorten the sheet through the line EF , yet a precisely similar force to that in the supposed case of the band was brought into play at each successive heating and cooling. A section of the sheet at the edge has three sides exposed, while all other parts have only two. Consequently, when the red-hot sheet was immersed in cold water, the edges having three sides of their sectional area (all along CD) exposed to the water, while the other parts (through EF and AB) had but two, the contraction along the edge CD took place more rapidly than along EF and AB , and the metal along the edge, by its cooling, shrinking and hardening, while that along EF was yet pliable, compressed this larger, and at that time hotter and softer metal, and produced a permanent shortening through EF . At each heating and cooling the same forces and changes occur; and although but little change takes place at any one of them, yet if repeated a number of times the aggregate becomes measurable and perceptible.

Now it may be asked how it happens that the distances through AB , EF and CD are not the same.

It is evident that shrinking a light band upon a square sheet or cooling the edges a slight distance inward, while the body of the sheet itself remained hot, could not bring a strain in the direction of AB sufficient to shorten the sheet in that direction, and therefore the sheet through that part would retain its original dimensions.

If the sheet along CD is reduced in length, say 1-16 of an

inch, by sudden cooling, while the metal along EF is still at or near a red heat, then the distance through that line will be correspondingly shortened, not from shrinkage of the metal along that line, but from the shrinkage of the metal along CD and from being attached to the metal along that line. If, then, EF , has been shortened 1-16 of an inch while hot, by the sudden cooling of CD , then when all parts of the sheet become cold alike, the metal along CD will be under a strain of compression, while that along EF will be the reverse, and if both were allowed to assume a position free of strain, EF would be 1-16 shorter than CD ; but as the area of the metal along CD under compressive strain is less than that along EF , the less must go with the greater, and CD is thus then further shortened by the metal along EF assuming the length due to its temperature—that length being the original length less 1-16 of an inch (the amount of shortening produced by cooling CD while EF was at or near a red heat, and before contraction of its own particles from cooling began).

As stated above, the metal along CD is left under a strain of compression when the sheet has become cold, and would assume a length greater than EF by 1-16 in. if freed from it, corresponding to that of the loose band in the supposed case, but being smaller in sectional area, the metal will be thickened, and the length conform to that of EF , but will remain under a compressive strain equal to the elastic limit, which, on being re-heated, will be relieved, and the length will then conform to that of EF without being under a strain. As in the case of cooling, so in re-heating, the sheet having three sides of the sectional area of the edges exposed to the heat, the edges will attain a temperature sufficient to relieve any strain upon them before the other parts are sufficiently heated to yield to such a strain, and will thus conform in length to the parts immediately connected to them. Thus, slight changes are produced both in heating and in cooling—principally, however, in this case, in cooling. The sudden cooling of the small area of metal along CD , first shortening a larger area along EF while hot, and then that along EF shortening the smaller area along CD when comparatively cold, seems to have been the forces brought into play in producing the changes in the form of the sheet used by Mr. Hayes in his experiments.

The tests made by Mr. Peddle were conducted under different circumstances and in a different way. It is shown by Mr. Peddle's experiments that when a plate is heated uniformly and allowed to cool off uniformly, no appreciable changes occur in the dimensions; but where the heat has not been uniform in all parts of the sheet, some rather extraordinary changes in dimensions and form are produced.

Fig. 2.

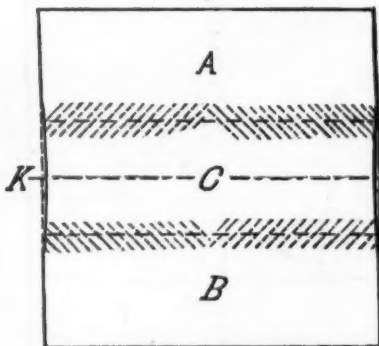


Fig. 2 represents the sheet experimented with, which was 12 inches square. In conducting the tests, by which the sheet was shortened, through the center (part C), the two sides, each 4 inches wide, were protected from the direct action of the fire by bricks (being walled in), while the part in the centre (C), 4 inches wide, or one-third of the sheet, was exposed to the direct action of the fire. The heat to which this part was subject for eight hours or more at each heating, was stated to be equal to the melting point of zinc (about 680° Fahrenheit). After two heatings, the metal in the heated part of the sheet (C), through the line KL , had lost 0.187 of an inch, or 1-64 of its original length, while no perceptible difference in the length of the sides of the sheet (A and B) was produced. The only matter of interest in this subject is an explanation of the causes and the forces by which this part C has been shortened, while the parts A and B have not.

The tensile strength of steel is not affected by temperature, within the limits of 212° and 992° Fah., but the elasticity of ordinary steel decreases above 252° , as demonstrated in experiments made by Fairbairn, M. Stemmer, and others. If these are the facts, and the elastic limit gradually decreases as the temperature increases, until a point is reached where the metal ceases to manifest any elasticity, then, it seems to me, a reasonable explanation can be given why the difference in temperature in different parts of the sheet produced the results reported by Mr. Peddle. The part of the sheet marked C , exposed to a temperature of 680° or 700° degrees, would, if freed from the balance of the sheet (A and B) which was kept at a temperature perhaps not above 250° , have assumed a length greater than A and B in proportion to the difference in temperature. But being connected to and a part of the sheet C , they cannot assume a length greater than A and B . If the length of C , through KL , owing to the difference in temperature, ought to be 1-16 of an inch longer than A and B , then A and B must elongate to conform to the length of C , or C must remain 1-16 of an inch shorter than the length due to its temperature, and conform in length to A and B , or A and B must elongate a portion of the 1-16 of an inch, and C must be restrained from assuming its proper length to the extent of the remainder. Now, as the sectional area of A and B is double that of C , so the elongation from strain of A and B would be only as 1 to 2,

in proportion to that of compression and shortening of C . This would be the result where the elasticity in A and B and C remained the same. But at a temperature above 252° , steel becomes less elastic, and in heating the sheet, A and B remain at a temperature which does not affect the elasticity, while C attains a temperature of 400° above that where the elasticity of the metal begins to be affected, and to a point where it is much reduced in range or limit.

In heating the sheet, the elastic limit of the metal in all parts of it is the same until the temperature of C has reached 252° degrees. From that on up to the highest (680°), we may infer, there is a gradual decrease in the range of elasticity; consequently when C has attained a temperature of 680° , the total range of elasticity of C through KL is less than through A and B in the same direction, for the reason that A and B are at a lower temperature. If, for instance, when C has become heated to 670° there is a strain from the elongation of C brought upon A and B , in the direction of the diagonal lines, to the extent that these parts of the sheet are elongated 1-16 of an inch, yet that 1-16 is within the elastic limit of A and B , and at this temperature the strain of compression brought upon C is also within the elastic limit of the metal in it. But if by increasing the temperature of C to 680° the elastic limit (range) of the metal is reduced one-half, or 1-32 of an inch, then this strain upon C , through the elasticity of A and B , will at once shorten C to the extent of the elasticity that C has lost by the increase of temperature, and if that loss was 1-32 or 1-16 of an inch, then C will have lost permanently that much of its length.

In other words, if by heating and elongating C the strain brought upon A and B would elongate those parts like a spring, and the heat was further raised in C until the metal became pliable and unable to resist the force of this spring, then C would be shortened to the extent of the motion of the spring, or partly so, and, as in the case of the band upon the square sheet, each cooling down, or wide difference in temperature at the same heating, would bring the same forces in play, and the sheet would finally assume the shape and proportions given in the result of Mr. Peddle's experiments.

If one side (edge) only of a sheet was submitted to a similar process of heating and cooling off, while the other side of the sheet remained cold during this treatment, then it would seem, if the above theory of the effects of unequal temperature in different parts of a sheet is correct, that the side so heated and cooled would become permanently shortened; for the reason that in heating the one edge or side of a sheet, we are consequently elongating it, and thus bringing a strain upon the cold part tending to elongate it (springing it in the same direction), and when the heated part attains a temperature where the metal loses its elasticity then this cold and elastic part under strain, being the greater of the two forces, overcomes the force of the heated and more pliable part, and it again assumes its original length, carrying with it and permanently shortening the heated part.

The above consideration of this subject can only be of interest to your readers so far as it may tend to induce further investigation, and assist in arriving at a correct conclusion in regard to a subject of more or less importance to the railway interests of the country, namely the cause that produces the cracks in the steel and iron fire-box sheets of locomotives using coal as fuel, and which occur unexpectedly and without apparent cause; and it is with a view to that end that I call the attention of your readers to this subject.

From the abundant evidence that was produced at the last annual meeting of the Master Mechanics' Association, we cannot attribute the cracks that occur in the sheets of fire-boxes to the use of an inferior quality of steel, in any considerable number of cases; but, on the contrary, sheets of steel in which cracks occurred while the sheets were cold (boiler not in use at the time) showed, when submitted to tests, remarkable ductility and strength. The fact was established, also, that such cracks almost invariably occur in large side sheets, and at a point near the middle of the length of the sheet, and begin a few inches above the top of the grate bars, and extend vertically to the distance of one or two feet, seldom going much below the grate bars, nor to a greater length than two feet. It was also shown pretty conclusively that on roads using water containing the largest proportion of impurities, such as adhere to the sheets in the form of scale, the proportion of cracked sheets is greater than on those where purer water is used. In fact, roads using comparatively pure water experienced but little, if any, trouble from cracked sheets. From the discussion it also appeared that cracks more frequently occurred in the sheets of engines usually worked up to their capacity of evaporation, such as used in running heavy and fast passenger trains, than occurred with those requiring a less evaporation in a given time. If, then, in the large side sheets of a fire-box, and when the sheets are coated with scale, and in the sheets of fire-boxes in boilers evaporating water to nearly their highest limit, cracks occur much more frequently than where the conditions and circumstances are the reverse; and if the cracks are uniformly in the middle of the length of the sheet, and are always, or nearly so, vertical in direction, it would seem that some such forces as were brought into play to produce the changes in the sheets experimented with by Mr. Hayes and Mr. Peddle, might reasonably be expected to produce rupture of the sheets of a fire-box under certain circumstances, and at some particular point.

We may safely conclude that the parts of sheets nearest where the coal is undergoing combustion will be hotter than parts more remote. This being the fact, then, we have a part of the side sheet, for instance, nearest where the coal is in combustion, corresponding to the part C in Fig. 2—a part at a higher temperature than those below it and above it—and also much smaller in sectional area than the upper and lower cooler parts of the sheet.

A side sheet of a fire-box for a locomotive having cylinders 16×24 inches is ordinarily about 66 inches square, and the top of the grate-bars about 12 inches from the bottom edge, con-

sequently the greatest heat in the fire-box would be about 18 or 20 inches above the lower edge of the sheet.

The important question to be determined before looking for a remedy is, why do steel or iron sheets crack in the manner, at the points, and in the direction stated; or why do they crack at all? Steel, such as is ordinarily used in the sheets of fire-boxes, is extremely tough and pliable, even when cold, and it is the rule in most cases to reject sheets when sample pieces cut from them will not bear doubling over, when cold, without fracture at the turn. Yet sheets showing this tenacity have, in numbers of cases, cracked after a few months' service. In all cases reported, the cracks occurred when the sheets were cold, and the direction of the crack was vertical and near the center of the length of the fire-box. What influences then have caused this loss of tenacity in the metal in this one direction, at some one place or point, while the metal in the opposite direction has retained its original tenacity? This fact was demonstrated by Mr. Setchel and Mr. Boone, who cut out pieces from sheets which had cracked (while the engines were standing in the house cold) parallel with the crack, some two or three inches wide, and which were doubled, cold (just as taken out, without being annealed), in the direction parallel with the crack. The writer also submitted a strip of steel cut from a cracked sheet, in the same manner, to like treatment, and found that the steel had lost none of its original tenacity.

From these facts it seems that while the metal of the sheet may still retain its original tenacity, after long use, in the one direction, there is one portion or spot where the metal does lose its tenacity to a certain extent in the opposite direction, and that that spot is in the portion nearest where the heat is the greatest.

Experiments conducted by Mr. Wohler, C. E., of the Prussian State Railway, a few years ago, demonstrate the fact that while a bar of steel may be loaded to a strain of 40 tons per inch and unloaded to 20 tons a very great number of times with safety, it will break down after a few trials if the 40 tons are entirely removed each time, and that the bar will equally break down with a load of 15 tons, if the weight or strain is applied in opposite directions alternately (elongation and compression), showing that alternate strains finally reduce the strength more than 50 per cent. compared with that where the strain applied is in one direction only.

Fig. 3.

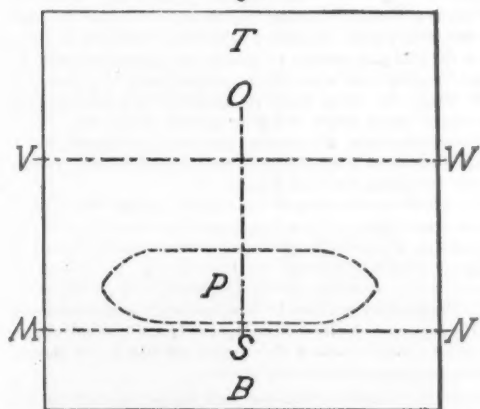


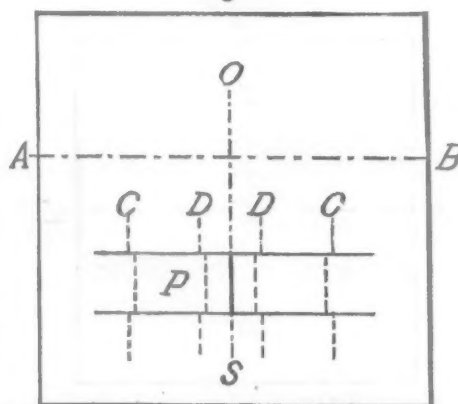
Fig. 3 will serve to illustrate the side sheet of a fire-box, and the part that is liable to alternate strains. *T* represents the top of the sheet at crown sheet, *B* the bottom, *M N* the top of grate bars, *P* that part nearest where the heat in fire-box is the greatest. If the sheet in all parts is free from strain when cold, then the conditions in that respect will be changed when heated to the working temperature. The temperature of the sheet at *B* would not exceed 212°, and at *T*, perhaps 880°; while at *P* the temperature would doubtless be, at least at times, much greater, and if greater, then that part of the sheet would be brought under a strain of compression, and if this strain exceeded the elastic limit of the metal, then *P* would be permanently shortened to that extent. Now if *P* is permanently shortened while hot, then when the whole sheet becomes cold alike, this part *P* will incur a strain in the opposite direction, or of elongation, and to the same extent, and if permanently shortened in the one case, will be permanently elongated in the other, or when cold; except that the elastic limit is probably greater in the latter case than in the former, and to that extent permanent elongation will be less than the permanent compression, or shortening, in the first instance. Each time the sheet is heated and again cooled these alternate strains are brought to bear on this part *P*, and the extent of those strains will be in proportion to the extent that the temperature of *P* has been greater than the other part of the sheet surrounding it.

As the part *P* is small in sectional area at the line *O S*, compared with the whole sheet, the strains produced in *P* by unequal temperature would not be felt, to an appreciable extent, tending to elongate or compress the sheet in the direction of *V W*, *P* being held as in a solid frame.

While the sheet remains comparatively free of scale, it is not probable the temperature of *P* would be much above the other parts of the sheet, and no injurious ranges of expansion could be produced; but if once coated with scale, the sheet would then attain a higher temperature, owing to the scale being a poor conductor of heat, and the expansion be proportionally greater, while the elastic element would be less in the highly heated portion than in the cooler part surrounding it; and as a consequence, if this part cannot assume a length corresponding to its temperature, and this compressive force exceeds the elastic limit of the metal, then it is permanently shortened, as stated in the former case, and when cold it then offers a strain in the opposite direction, or of elongation. But so long as this strain does not exceed the elastic limit of the

metal no apparent injury occurs. It might be a question, however, as to how long these alternate strains may be continued without affecting the tenacity of the metal at this point and in the direction where they are greatest. We may assume that the less the strains the longer they may be continued without injury; and that in the direction in which no strains occur, no injury is done. A point a few inches above the grates may attain the highest temperature, yet this would not be likely to produce vertical strains to any injurious extent, as this line would extend entirely around the fire-box, and the temperature on any one line around it, equally distant above the grates, would not materially differ, except, perhaps, being slightly greater at the center of side and end sheets than in the corners; and the vertical expansion therefore remains nearly the same, whether on a line up the center of the side sheets, up the corners of the fire-box, or up the end sheets. Then if but little vertical strain exists, no cracks should occur that run in a horizontal direction; and from the evidence on this point no cracks have occurred in the sheets of the ordinary-shaped fire-box that extended in a horizontal direction. All the cracks reported as occurring when the sheets were cold were vertical in direction. If the cracks occur at or near the center of the length of the sheets, it would seem there should be a reason, why at that point. The temperature of the sheet is doubtless something less at the edges, in the corner of the fire-box, than at the center (*O S*). Besides, it is riveted to the flanges of the end sheets. Now, if this part *P*, where it is hotter than the other portion of the sheet around it, was detached or cut from it (as represented in Fig. 4), and thus allowed to assume the length due to its temperature, it would, when hotter, be displaced from its original position, more at the lines *D D* than at *C C*, and if cut vertically at *O S*, would overlap at that point. But if *P* could not overlap, and the strain exceeded the elastic limit, then the metal along *P* would be compressed, and the sheet thickened, and as the elasticity of the sheet depends upon its temperature when above 252°—being less elastic at the higher temperatures—then that part of *P*, ordinarily at the highest temperature, would be least elastic and the soonest to yield to this force of compression; and as the center of the fire-box is doubtless hotter than the corners, we may conclude that this hottest part of *P* is not far from the center *O S*, and that somewhere near that point the disturbing forces produced by the unequal temperature of the sheet will be greatest, and as a consequence, if they exist to such an extent as to effect the tenacity of the metal, the rupture will be likely to occur at some place near the center, *O S*.

Fig. 4.



If the forces considered are those that result in the cracks in sheets, which have occurred without apparent cause in so many cases, what is the remedy? Can it be found in substituting iron for steel? From the experience had with iron sheets in coal-burning fire-boxes before steel was introduced, they were found to be unreliable and unsatisfactory in their results, on the average, and on the whole much less reliable than steel has been; and it is not probable that better iron is made now than formerly; and besides, iron originally of the best quality has been known to crack without apparent cause, even in fire-boxes of wood-burning engines, in the same way that the steel sheets have, and under the same circumstances.

Steel seems to meet all the requirements, when made sufficiently pliable and tenacious, with this one exception—the tendency to crack after cooling off. Before condemning it we should determine whether the fault is one inherent in the steel itself, or whether it is in the service required.

A manufacturer would not be likely to warrant a sheet if placed in a situation where it would be slightly compressed beyond the elastic limit when the boiler is hot, and then elongated to its original length every time the boiler becomes cold. Yet if this occurs in any part of a sheet which after a time gives way, he may not be to blame so much as the designer of the boiler.

Any temperature that steel will attain, while in contact with water, and when comparatively free from scale, does not seem to injure it. We find the metal from tube sheets, near the center of the mass of tubes, where the proportion of metal in contact with the water is smaller than that exposed to the heat, and where a strong draft into the tubes naturally produces a high temperature, remains soft and pliable after a number of years in use. Thin sheets would be less likely to crack than thick ones, other things being equal, for the reason that the temperature on the fire side would remain lower, and consequently the danger from injurious strains caused by expansion be less.

Shallow fire-boxes—even very long ones—would be in less danger of cracking than deep ones, for the reason that the whole sheet, and also the crown sheet, would be more nearly of the same temperature from being nearer the fire; conse-

quently there would be less difference of expansion between the hottest and coolest parts of the same sheet, and of the different parts of the fire-box as a whole, than occurs in the case of the deep boxes.

Small sheets in the direction of the line of the greatest heat will be less liable to crack than those very large in that direction, height being the same in both, for the reason that the difference between the expansion of the hottest part, *P*, Fig. 4, and the surrounding sheet will have accumulated to less at *O S* than in the case of a very long sheet. The long and deep sheet is most likely of all to crack for the reason that this difference assumes greater proportions at *O S*. The longer the sheet the greater would be the displacement at *D D* from the difference in temperature of the two parts of the sheet, and the greater the displacement of the particles of the metal composing it; and when such displacement exceeds the limit of elasticity of the metal, and that, too, in alternate directions, the sooner will the tenacity of the metal at that point be injuriously affected in the direction of the strains; and as they would be horizontal, the crack, if one occurred, would be vertical in direction.

It is more than probable that these alternate strains, in some instances, finally reduce the tensile strength of the metal at some one place along the line of strain, and that rupture occurs at that point (invariably beginning at a stay-bolt hole)—selecting the weakest—the metal at other parts still retaining its original strength; while the strength of the metal, and its ductility in the direction at right angles to the line of strain has not been in the least impaired. This would account for the results shown in the tests made by Mr. Setchel, Professor Thurston and others of pieces of steel taken from sheets that had cracked while cold, and which had been cut out immediately alongside the cracks, which were found to be in every respect as strong, elastic and pliable as when put into use new.

It is evident that the large side sheets of comparatively deep fire-boxes, made of the best quality of steel, have in a great number of cases cracked while cold, from tensile strain in the portion subject to the greatest heat, as well as sheets that were of inferior quality.

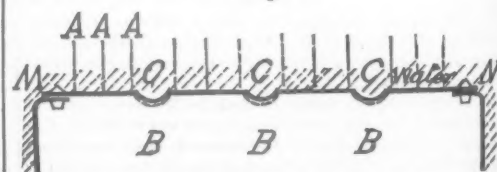
This being the case, some modification of the shape of the parts liable to crack, so as to prevent unequal temperatures at the different parts of the sheet from bringing injurious strains upon any part of it, would seem to be most likely to accomplish the end desired.

Corrugated side sheets have been used for many years by Mr. Charles Graham in the anthracite coal-burning engines on the Lackawanna & Bloomburg Railroad, and he reports that no instance has occurred in which a sheet of that kind has cracked when cold. More recently corrugated steel sheets have been largely used in the fire-boxes of engines on the Chicago & Northwestern Railway, and perhaps others, and, so far, with good results. No instance has been reported of a sheet cracking when cooling down, or when cold.

Corrugating the entire sheet renders it more difficult to manipulate to the proper shape in other directions, and may interfere more or less with the proper position of the stay-bolts, unless great care is observed as to distances between the corrugations.

As plain sheets of small area have shown no tendency to crack, two or three channels, such as represented at *C, C, C*, Fig. 5, in the side sheets, and extending from the grate bars about two feet up the sides of the fire-box, would probably answer as well as any other arrangement as a preventive against cracks. Fig. 5 represents the section of such a sheet a few inches above the grates. Dotted lines, *A, A, A*, represent the position of stay-bolts; *C, C, C*, the channels referred to between the vertical rows of bolts, the channels being on the inner or water side of the sheet. The strain of compression along the sheet when heated to a higher degree at this point than the balance of the sheet would tend to spring the arch forming the channels towards *B, B, B*, to the position represented by the curved dotted lines.

Fig. 5.



The side of the sheet next to the fire would doubtless be at a slightly higher temperature than the opposite side; the metal, in the outside of the arch would expand most and tend to spring it towards *B*, and, as a consequence, relieve somewhat the strain of compression referred to along the sheet in the direction of *M N*.

Ordinarily the part of the sheet marked *P*, Fig. 3, after repeated heatings and coolings, assumes such dimensions that when hot it is under a strain of compression, and when cold under one of tension, the strain then, in either case, not exceeding the limit of elasticity. But as metal yields more readily to strains when hot, and the boiler is usually hot a greater proportion of the time than cold, it is probable that the compressive strain when hot is much less than that in the opposite direction when cold. At the same time, the metal when cold is more elastic, and will admit of greater elongation under strains without permanent change of dimensions. That the part of a sheet in which the crack occurs is under a tensile strain at the time there can be no question, and that the crack does not occur while the sheet is hot, but only when cold or nearly so, is also a fact, and that the tensile strain is mainly in the direction of the length of the fire-box is equally apparent, from the fact that the crack is invariably vertical in direction, at least starting in that direction, sometimes yielding to the influence of a slight vertical strain (produced originally from

(the same causes producing the longitudinal strain) and assuming a diagonal direction at certain places in its length.

If the forces considered in this communication are those that sometimes result in cracks, this fact should be considered and guarded against, in designing the form and dimensions of sheets exposed to great variations of temperature in their different parts, rather than expect to find a remedy in a quality of metal that will stand compression and elongation to the limit of elasticity—sometimes exceeding it—(alternate strains) without in any case, sooner or later, resulting in a crack.

JEFFERSONVILLE, July 30, 1875.

R. W.

Combustion of Coal.

[The following letter and the drawing which accompanied it were received some months ago, but, owing to delays in engraving the latter, have not been published heretofore. They will probably, even at this late date, be of much interest to many of our readers.]

TO THE EDITOR OF THE RAILROAD GAZETTE:

After the letters which have appeared in your *Gazette* lately on the subject of engine performances and the economic combustion of fuel, together with your notice of the "Cudworth coal-burning fire-box," I think now that the curtailment of expenses and imperative retrenchment in all matters connected with railway management, is the order of the day, that those interested in the subject of consumption of fuel will see the time has arrived to carefully investigate it, with a view of ascertaining beyond cavil the loss (if any) sustained annually through the present system, and which, I venture to say, will be found to be on some railways enormous.

The Cudworth fire-box has proved itself to be a good, if not the best, bituminous coal-burning arrangement in use; it is

properly-constructed ovens, and so put into such a form that it could be burned in the locomotives.

After having determined the most economical way of burning the kind of coal attainable on each railroad, then institute a thorough system of keeping the account of consumption of fuel per car per mile, but until the evaporative value of the coal used is thoroughly determined, those accounts will be of no value for comparison with other railways, unless they use the same description of coal and in the same way.

You will observe that the smoke-box is considerably larger in those engines from which the drawing is made than is the usual practice in America, and that the blast-pipe orifice is above the top row of flues. By this means the large smoke-box acts as an air vessel does to a pump—softens the pulsations, and causes the draught on the fire to be nearly regular and constant, while the top row of flues, being nearest the partial vacuum formed by the blast, have the greatest draught, and, being furthest from the grate, have less tendency to lift the fire. The fire-box being very large, the forced combustion on each square foot of grate is much less than in a smaller box with the same blast pressure. It is a very rare occurrence for these engines to emit fire from the chimney.

THOS. C. WILKINSON.

Master Car Painters' Association—Sixth Annual Convention.

The Sixth Annual Convention of this Association was held at the Grand Central Hotel in New York Sept. 8 and 9, about 20 members being present. For the notes from which this abstract of the proceedings was prepared we are indebted to the courtesy of Mr. G. W. Houghton, Editor of *The Hub*.

The Association assembled on the morning of Sept. 8, the proceedings being opened by the reading of the reports of the Secretary, the Treasurer and various committees. The officers of last year were then re-elected. The President, Mr. M. W.

best brushes for varnishing. Committees were appointed to report at the next Convention on the following subjects: Paint and Varnish Cracking, Messrs. Fleming and Burch; Priming and Preparation of a Car Ready to Varnish, Messrs. Wills and McKeon; the Surfacing and Amount that it is Practicable to Put on a Car, Messrs. Beazley and Marsh; Colors, their Manufacture, Adulteration and Causes of their Fading, Messrs. Grotenrath and Stines; Ornamentation, including the most Adaptable Styles for Railroad Work, and including the Best Gold Sizings and Colors, Messrs. Kirkpatrick and Forristall. After the usual votes of thanks to reporters and others, the Convention then adjourned to meet in Philadelphia, Sept. 21, 1876.

THE SCRAP HEAP.

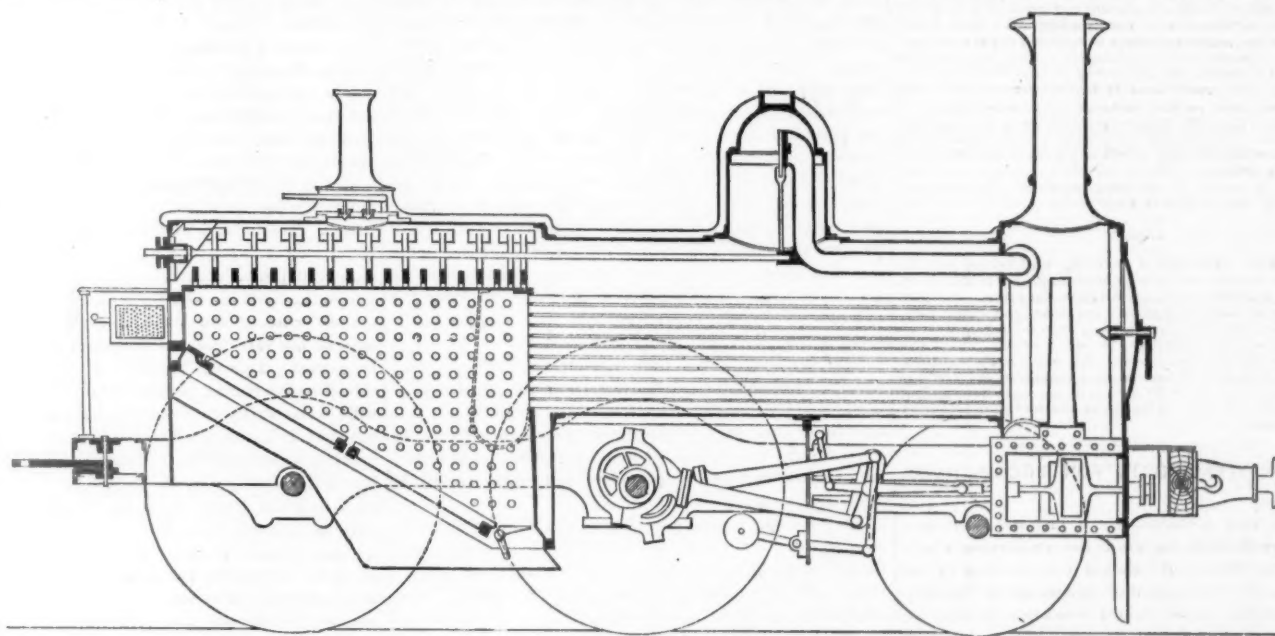
Railroad Manufactures.

A new company, organized in Baltimore and called the Wyeth Iron & Steel Company, has bought the Mount Vernon Iron Works in Rockingham County, Va., and has fitted it for work. The furnace tract includes 38,000 acres of land, on which there are a cold-blast charcoal furnace and a bloomery with eight fires and two hammers. There is water power on the tract, part of which is in use for the furnace.

The Gaylord Rolling Mill at Portsmouth, O., was partly submerged by the late floods in the Ohio River and was compelled to stop ten days. The mill is now running full double turn, having large orders on hand, especially for boiler plate.

The Bethlehem Iron Company has recently built a small furnace 23x8, in which they will hereafter make the Spiegeleisen which they use in the manufacture of Bessemer steel. The ore used is brought from Spain. Spiegeleisen is made nowhere else in this country, except at the Cambria Works, which also uses Spanish ore.

The *Iron Age* says: "The Schuylkill Haven Rolling Mills Weissinger & Medlar, proprietors, Schuylkill Haven, Pa., had three buildings. The rolling mill is 80x120 feet in size, and contains two annealing furnaces and two trains of rolls, one 14 and the other 18 inch, also a set of T rail rolls, three sets of shears, and one circular saw for cutting rails. Two engines, one of 50 and the other 100 horse-power, furnish the motive power. Adjacent to the mill are the two other buildings, one 80x50 feet for storing finished work, and a stock room 50x75



Scale 0 1 2 3 4 5 6 7 8 9 10 11 12 13 ft.
SECTION OF LOCOMOTIVE WITH CUDWORTH FIRE-BOX.

easy to manage as described by Mr. H. Fry in your issue of Jan. 2. It has occurred to me, though, that possibly some of your readers would be interested in having some few more particulars concerning it. I have therefore sent you, in company with this, a section of the Cudworth engine, which will convey a better idea of the whole arrangement than the cut you have already produced in your issue of Nov. 21, 1874.

The fire-box is divided longitudinally by a mid-feather or diaphragm into two boxes, each furnished with a fire-door and a door underneath the bars for the purpose previously described in the *Gazette*. Each grate consists of 30 wrought-iron bars 1 inch thick, in two lengths, with air spaces of 5-16 of an inch between them. These boxes will burn any description of English coal with almost perfect combustion; but the kind preferred is a Newcastle coking coal, from which an evaporation of 9 lbs. to 9½ lbs. of water per pound of coal is obtained. This is, after all, the proper test of the value of coal, and if any superintendent or others contemplate making a series of experiments to test the work done by the coal, I would recommend them to fit their tenders with properly graduated indices of contents to their tanks, so as to note exactly the water consumed, taking care that as little as possible is wasted, and that little accounted for. Let them put to watch the experiments a thoroughly reliable and unbiased man, make a series of experiments extending over say three months with the coal as they now get it from the mines; then take the same coal, with all dust, small coal and foreign matter sifted out, and put it to the same test, and if due and proper care has been observed in the weighing of the coals and gauging the water, I venture to predict that the latter will prove itself to be by far the most economical, without taking into consideration the cost of transporting the refuse from the mines to the coal stations and the cost of the engines carrying this refuse, which is worse than useless in the fire, and where it refuses to remain, but is drawn through the flues, and churned to powder in the smoke-stack before it can escape, and it is then too often a source of intolerable inconvenience to the passengers. The aforesaid small coal could be sifted from the good at the mines and at small expense be coked in

Stines, then made an address in which he gave a brief history of the Association from its formation in 1870. He urged upon members the necessity of care and economy in their work, spoke of the many opportunities for displaying their taste and talent, and especially referred to the importance of using the best materials always. Some appointments of committees were made and an adjournment had until afternoon. It was explained that the small attendance was largely due to the difficulty of obtaining passes for members.

At the afternoon session some amendments were made to the constitution. Mr. Houghton described the formation and management of the National Carriage Painters' Association and suggested some subjects for discussion. The Secretary, Mr. R. McKeon, then read an exceedingly instructive and interesting paper on the "Process of Car Painting." This gave rise to a discussion of the question, "How much oil should be used in the finishing color?" Mr. McKeon advocated mixing stiff enough to grind with two parts Japan dryer and one part linseed oil, thinned with turpentine for use. Mr. Cox used one-quarter oil, one-quarter turpentine, and one half Japan dryer. A debate on hard-drying varnishes followed. The expense of the method described was inquired into and stated to be \$600, including \$175 for head-lining. Complaint was made by several members of the insufficient time usually allowed for painting a car. Mr. Beach thought that some of the fault was with master painters, who did not make their needs fully understood. Master car-builders and master mechanics were more liberal than they were generally supposed to be.

In the morning session of Sept. 9, which lasted four hours, animated discussions were had on the best primer; raw or boiled oil; how to prime iron and tin; coal tar; Valentine's permanent wood filling; metallic paint; iron-clad paint, or mineral brown; to prevent iron rust from striking through; tests for good linseed oil; Reno's French umber on wood; white lead vs. mineral paints; cleaning off tanks inside with steam; potash for cleaning off paint; Japan, gold-size and other dryers. The subject of colors was then discussed, including the browns, Venetian red, the ochres, lamp-black, white lead and barytes. The subject of vermilion was introduced and some interesting facts brought out. Mr. Forney, of the *Railroad Gazette*, then addressed the meeting, advocating less elaboration of outside ornament and greater variety of interior decoration. He suggested prizes for the best original designs. The committee on place of next meeting reported Philadelphia as the place selected. The date of the annual conventions has been fixed for the third Wednesday in September of each year. The afternoon session was devoted to discussion on the subjects of cracking of paint; elasticity in colors; too generous use of oil; prepared colors; sap wood; mixing of paints; the umbers; application of varnishes; excessive rubbing of varnish coats;

feet. The company at present employs about 60 hands and turns out about 12 tons of manufactured iron per day, with a capacity for double that amount in busier times.

It is said that the furnace owners of the Schuylkill Valley have generally declined the proposition made them by the Philadelphia & Reading Coal & Iron Company, to furnish them with coal, ore and limestone and take from them the pig iron, paying them a fixed price for manufacturing it.

The Pittsburgh & McKeesport Car Company has so many orders on hand that the shops have been running extra time.

The Litchfield (Ill.) Car Company is at work on a number of passenger and freight cars for the Union Pacific road.

The Indianapolis Rolling Mill has contracted to furnish a lot of 60-pound iron rails for the Louisville, New Albany & Chicago road.

Billmyer & Small, of York, Pa., have just turned out an additional passenger car for the Fallado & Eureka (narrow-gauge) road. The car is handsomely finished, is 7 feet wide and the seats are arranged in two rows, one half are double seats and the other half single. The single seats are placed on one side of the car half its length and on the opposite side the other half.

The Edgar Thomson Steel Works.

The formal opening of the Edgar Thomson Steel Works at Braddock's Field, near Pittsburgh, Pa., took place September 4, in presence of a large delegation composed of representatives of the press and leading industrial interests of Pittsburgh. A large number of prominent railroad officials were present, and great interest was manifested in the success of this industry. The steel is manufactured by the Bessemer process and the works are among the largest in the country, having an annual producing capacity of 400,000 tons, representing a cash value of nearly \$3,000,000.

The Detroit Car Works.

The *Detroit Tribune* of Sept. 14 says: "The Detroit Car Company has failed and made an assignment to Samuel T. Nelson. The company had a paid-up cash capital of \$150,000, and possesses a fine property, including much real estate. If this property can be disposed of without resort to a forced sale, it will undoubtedly prove to be sufficient to pay all the indebtedness, and leave a handsome surplus; even taking the most unfavorable view of the present situation there is little doubt that the Detroit Car Company will pay 100 cents on the dollar. In fact, their liabilities are, with the exception of a few thousand dollars, secured, but dull times in their business and the placing of so much money in real estate, which cannot be immediately made available, have brought their sled to a spot of bare ground over which, as before intimated, they will, no doubt, make safe progress."



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Editorial Announcements.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE SIZE OF STEAM-PORTS FOR LOCOMOTIVES.

One of the first problems which presents itself to a young designer of steam engines is the proportion which the area of the steam-ports should bear to that of the piston. From the vast amount of discussion of this subject and its present undetermined condition it may, we think, be safely inferred that no categorical solution is possible. The fact that with the link motion, when the valve is worked so as to "cut-off short," only a small fraction of the port is uncovered for the admission of steam, makes it necessary to consider the size of the ports in relation to the action of the link. The question which we should ask is, what object should be accomplished by the opening of the steam-ports? The answer will obviously be, that the ports are opened for the purpose of admitting steam into the cylinder, and that the opening should be so large that the steam which enters the cylinders while the ports are open will not be reduced in pressure materially below that in the boiler. An obvious question to ask here would be, if the pressure in the cylinder during admission is reduced below boiler pressure, or is wire-drawn, what will the effect be? An answer to this involves some rather intricate considerations, and in making a satisfactory reply it will be necessary to bear in mind some of the laws of heat and steam. The first law of thermodynamics, as stated by Rankine, is, that "heat and mechanical energy are mutually convertible." When steam expands and does work, it loses heat in the proportion of one unit for 772 foot-pounds of work done; but if steam expands without doing work, it becomes slightly superheated to a temperature higher than that due to its pressure. When steam is admitted into the space left in a cylinder by the receding piston, through an aperture so small that the space is not filled to full boiler pressure, then expansion occurs under both of the above conditions—that is, the steam does work by pushing the piston before it, and it also expands without doing work when it flows from the boiler at a high pressure and expands to a lower one in the cylinder. The source of loss is due to the fact that the steam expands from a high pressure to a lower one without doing work. It is true that in doing so it becomes slightly superheated, but the loss on the one hand is much greater than the gain on the other.

Without going into a very full elucidation of this subject, it will be seen that if the steam enters the cylinder much below boiler pressure, there will be a very considerable loss of potential energy in the steam, and, conse-

quently, a waste of fuel due to this cause. It is therefore important that the opening of the ports should be sufficient to allow steam of very nearly full boiler pressure to fill the cylinder while the port is open. Now there can be no doubt that an area of port very much less than the whole area of those ordinarily used would be amply sufficient to allow steam to enter the cylinder without being reduced in pressure or wire-drawn, even at the highest rates of piston speed practically employed. The difficulty is, however, that the link motion does not open the ports more than about a third or fourth of their area when cutting off steam at the same proportions of the stroke. It is, too, at these points that the valve gear is worked when the engine is running at the highest speeds, and when there is, of course, the greatest difficulty in filling the cylinders with steam of full pressure. In proportioning the steam-ports for locomotives, therefore, they must be made large enough so that less than a third or fourth of their area will be sufficient to admit steam of boiler pressure at the highest rate of piston speed.

Here it may very properly be asked, how can it be known whether the opening is sufficient at high rates of speed. To this it may be answered that it can only be known by the careful use of the indicator. There is, however, this refuge of safety, that no harm—at least so far as the distribution of steam is concerned—will result if the ports are made too large; whereas if they are too small, there will be a constant loss of efficiency when cutting off short and running fast. In proportioning steam-ports it is therefore always best to be in error on the safe side.

At the present time an impression is very common among master mechanics that the steam-ports of locomotives have of late years been made much larger than is necessary. This may possibly be true, but it is also held by some that the large ports are a serious detriment to the economical working of the engines, and in some cases either the ports have been partly filled up, or the valves so constructed as to cover up a portion of the length of the ports. It is hard to understand what useful end is accomplished thereby. Undoubtedly the nearer the pressure in the cylinder, during admission, is to full boiler pressure the better. Now, no matter how large the opening of the ports may be, the only effect which will result therefrom will be to allow more steam to enter the cylinder in a given time, and thus the pressure in the latter will approximate nearer to that in the boiler. But even if the area of the port opening is too large, what harm? It is certain that the steam will not fill the cylinder at a pressure higher than that in the boiler, and if it is less, there will be a corresponding loss and waste. In other words, it is impossible to get too much steam into the cylinder during the period of admission, but it is quite easy to get too little.

We heard it argued some time ago that with small steam-ports it was possible to run a locomotive with the throttle wide open, and thus the full advantage of expansion could be realized, whereas with large ports it was impossible to open the throttle wide without increasing the speed too much. Now supposing it should be found that a locomotive with large steam-ports cutting off at one-third of the stroke would run too fast if the throttle was opened wide, but that it would be quite practicable to work such an engine with full admission at the throttle, if the steam-ports were reduced in size: what is the difference in the action of the steam in the two cases? As steam is cut off in both instances at one-third of the stroke, obviously if the speed is reduced in the one case it must be because the cylinders are not filled with steam of so high a pressure as in the other. That is, the steam is wire-drawn by passing through the contracted ports, which, we have shown, diminishes its efficiency and makes the engine less economical in its working. If the speed of the engine becomes too great with the throttle wide open and cutting off at one-third of the stroke, it can, of course, be diminished by partly closing the throttle valve; the only difference between the working of the engine when the throttle is partly closed and that which occurs when the ports are reduced in size is, that in the one case the steam is wire-drawn by the throttle and in the other by the slide-valve. If it is desired to work with the throttle wide open, a much better plan is to provide long quadrants or sectors for the reverse lever, with as many notches in it as possible, so that the speed of the engine may be regulated by the point of cut-off and not by wire-drawing the steam through the throttle-valve. To do this, it is very important, however, that the valve-gear should be so proportioned that the port will be opened wide enough to give ample admission of steam when cutting off at the shorter points of the stroke. It is a fact which is either not generally known or is not sufficiently appreciated, that eccentrics with a long throw will cause the valve to open the ports wider when cutting off at the same point of the stroke than it would if the eccentrics had a shorter throw. That is, if the eccentrics have 5½ in. throw the valve will open the ports wider when cutting off at one-quarter of the stroke than it would if the throw were only 5 in. The consequence is, that it very often happens, owing to the diminished throw of the eccentrics, that the valve does not open the ports sufficiently at the

lower points of cut-off to admit steam at boiler pressure, and consequently the engine cannot do the work required of it when working in that position; whereas, if the valve opened the ports wider it would do the work very easily.

Another fact is also often lost sight of in connection with the notches in the sector to which reference has just been made. The notches are usually laid off so that the valve will cut off at some even number of inches of the stroke, such as 6, 9, 12, 15, etc., or 6, 8, 10, 12, etc. Now, supposing that the steam fills the cylinder during admission to very nearly full boiler pressure, and that the engine is working at 9 inches, and it is found that more steam is admitted to the cylinders than is needed to do the work, if there is no notch between 6 and 9 inches the period of admission or the amount of steam will be reduced 33½ per cent. if the lever is thrown back one notch. Quite possibly so great a reduction may not have enough power to do the work. If the engine is working at 6 in. and more power is needed, the only increase possible would be an addition of 50 per cent. more admission. Quite naturally, therefore, locomotive runners get into the habit of regulating the speed of their engines by the throttle and not by the point of cut-off. Besides reducing the period of admission, the link-motion reduces the area of the opening of the ports when cutting off short, so that the actual difference of the steam admitted at any two points is even greater than that indicated by the points of cut-off. What is needed is as much opening of the ports as practicable at the shorter points of cut-off and then more notches in the sector, so that the period of admission can be either increased or diminished by smaller increments than is usually possible with ordinary reverse levers.

The advantages of the Allen valve in giving a larger port opening at the shorter points of cut-off have heretofore been referred to in these columns. This valve seems to be growing in favor in Europe, especially on the Continent, but is almost unknown here.

In the preceding remarks we have not taken into consideration the question of the friction and wear of the valves. The former, we believe, has been very much overestimated, or at least an exaggerated idea prevails of the amount of power absorbed in overcoming the resistance due to the friction. There is also no doubt that the danger of "cutting" the valve and valve-seat, and also the wear of the valve gear, is increased with the throw of the eccentrics. This is, however, a practical question to be solved in the engine house and on the road, and is one with reference to which mere theoretical investigation can have but little value. We believe it is true that there are many more locomotives running in which the port openings at the short points of cut-off are too small than too large, and that greater economy of working would result from an increase than from a reduction of the area of opening at those points. The increase may be effected either by increasing the length of ports, the throw of the eccentrics, or by the use of such devices as the Allen and also the Gleason and Wilson's slide valves, which were all illustrated in the Railroad Gazette of November 14, 1874.

AMERICAN RAIL CONSUMPTION.

The American Iron and Steel Association has collected and recently published in its Bulletin statistics of the total production of all kinds of rolled iron in the United States. Aside from the importance of these statistics as exhibiting the condition of a great national industry, they have a special value to the railroad interest as giving a key to the sources of their supply, especially of rails, and, indirectly, of their consumption of the latter material.

The returns of rail production show that during 1874 the amount manufactured in the United States of all kinds was 729,413 tons, against 890,077 in 1873, 1,000,000 in 1872, and 775,733 tons in 1871. Of last year's production 144,944 tons—one-fifth of the whole—were of Bessemer steel, 17,181 other steel or steel-headed rails, 32,480 tons were iron rails weighing less than 40 lbs. per yard, 323,035 tons—44 per cent. of the whole—re-rolled iron rails, and 205,034 tons were new iron rails weighing 40 lbs. or more per yard. The latter, thus, were about 28 per cent. of the total rail production, and exceeded the production of steel and steel-headed rails only by a quarter.

These returns give us the material for ascertaining approximately the average life of rails on the railroads of this country. We cannot ascertain it exactly, for want of definite knowledge of some of the elements. We have the total mileage of road and the total mileage of new road constructed each year. If, then, there was a uniform weight of rails in each mile of road, and each mile of road included simply a mile of track, our problem would be a very easy one. But our mile of road is sometimes more than a mile of track, and we have no figures for the mileage of sidings and second tracks. The difference in the weight of rails is considerable, but will not lead to any very great error. Again, the production and importation of one year is not wholly consumed during that year; and if we were to take a single year, we might make a considerable error on that account. But this error will be

largely eliminated by taking the figures for a series of years.

Below we give the mileage of new railroad constructed each year, the probable consumption for that purpose, and the total tonnage of rails manufactured and imported for each of the past three years:

	Miles of new railroad.	Rails in new railroad.	Rail production.
1872.....	7,540	675,280	1,330,860
1873.....	8,933	823,636	1,148,850
1874.....	2,025	172,125	837,995
Total.....	13,198	1,200,041	3,317,705

In reckoning the weight of rails in the new railroads, we have assumed an average of 92 tons per mile for 1872 and 1873, and for 1874, when a large proportion of the mileage was of narrow-gauge, with rails weighing from 30 to 40 lbs. per yard, 85 tons per mile. If now we subtract the figures in the second column from those in the third, we will have the tonnage of new rails left for renewals of the old roads. Below we give these figures, prefixed by the mileage of railroad at the beginning of the year, on which these renewals were made, and followed by the tons of rails per mile of road available for renewals:

	Railroad mileage.	Tons of rails for renewals.	Tons per mile renewed.
1872.....	59,478	665,570	11.2
1873.....	66,815	796,214	11.9
1874.....	70,651	665,570	9.4
Total.....	196,947	2,317,354	11.75

Although, for reasons mentioned before, the consumption of each year does not exactly coincide with the supply of that year, yet doubtless the rapid decrease in the amount used per mile in renewals shown by the figures corresponds with the facts. More than a third less per mile seems to have been used in 1874 than in 1872.

The average for the three years shows a yearly consumption of rails for renewals equal to 11½ tons per mile of railroad. Now this mile of railroad represents considerably more than a mile of track, for with it are included all the sidings and second tracks. A mile of track of 56-lbs. iron requiring 88 tons, our average mile for the country certainly cannot be less than 100 tons, and the average consumption of rails for renewals for the three years ending with 1874 was but 11½ per cent. of the rails in track, on this basis—equivalent to an average life of very little less than nine years.

This seems a very long life for rails, most of which are iron and many very poor iron. But our errors are more likely to be in giving too small an amount for new construction and too small an average weight per mile in the old railroads than in the other direction, and such errors tend to exaggerate the average percentage of renewals.

The decreasing proportion of renewals indicated by the figures above is, we say, probably in accordance with the facts, though the rate of decrease is probably exaggerated. One patent cause is the poverty of the railroad companies, which have permitted their tracks to depreciate in many cases; but another which already has considerable effect is the increasing use of steel rails. The production and importation of Bessemer rails according to the returns of the American Iron and Steel Association, have been for three years:

	1872.	1873.	1874.
Home production, tons.....	94,070	129,015	144,944
Importation, tons.....	149,786	169,571	100,486
Consumption.....	243,856	298,586	245,430

Thus within three years 777,872 tons of Bessemer rails have been put into our railroads, making probably 8,600 miles of track, besides what had been laid previous to 1872. We have no means of ascertaining what the consumption was before 1872, the reports of importations not separating steel from iron rails; but the home production had been 91,675 tons—enough for a thousand miles of track. Very little of this has been worn out, and we have thus an account of some 9,600 miles of steel track, besides that laid with rails imported before 1872. This is something like an eighth of the mileage of the country; but, what gives it its special power in reducing the average rate of renewals, this mileage is just that which is most worn—much of it where iron rails would not stand two years. Doubtless one-half of the wear of rails in this country is on less than one-quarter of the track, so that the laying of this quarter with more durable material will have a disproportionate influence in reducing the necessary renewals.

It is evident that the increasing use of steel rails tends to lessen the demand of railroads on the iron works. If the steel lasts six times as long as iron, then not only is there only one-sixth of the work required from the rolling mill, but only one-sixth of the pig iron from the blast furnace and one-sixth of the ore from the mine. And this reduction is likely to have a decided effect on the iron industry; for rail production is a large proportion of the whole iron manufacture. Even last year rails formed nearly 40 per cent. of all the rolled iron produced in this country; in 1873 the proportion was 45 per cent.; in 1872, more than 50 per cent. Now should steel once become general, and the wear be reduced five-sixths in consequence, the market for about 25 per cent. of our production of rolled iron, based on last year's production, would be destroyed. Of course, the destruction of a demand in this way, by the creation of a more durable material, is

not to be regretted, but the contrary; but it is a fact to be taken into account in estimating the supplies which it will be necessary to provide in the future.

The Fast Mail Trains.

This week, on two of the leading routes to the West, trains for carrying mails exclusively have been placed, and these run at speeds hitherto unequalled in America on long routes, so much so that between New York and Chicago, 979 miles by the longest and 912 by the shortest route, nearly ten hours is saved over the quickest train running previously.

At this writing trains have run only on the shorter route, the Pennsylvania; but the time-tables are made out for the other, which was to start from New York on the morning of Thursday of this week.

Heretofore the great letter mail of New York has been taken by the trains which leave on the evening of the day, at about 8 o'clock. This enables the mail of the day to begin to move forward soon after it is written, and by working hours the next day to reach places 300 miles away, and before the close of business hours it passes the places within 500 miles.

After that time it matters little to the writers and receivers of mail whether it shall reach its destination a few hours earlier or later, provided it gets there the next morning. Now the mails sent from New York by the trains known as "Pacific expresses" on the different roads reach Chicago early on the morning of the second day, and generally a letter posted in either city on one day is received in the other in time to answer on the second day thereafter.

To improve on this arrangement is not easy. If the train starts at the same time as the Pacific express and runs faster, it will distribute mail over a greater extent of line in time to be delivered the following day, but it will not arrive in Chicago in time for that, and the letters which reach the Chicago post office, say at 10 at night, will only get to those to whom they are addressed the next forenoon—very little earlier than by the old arrangement. If the time of starting the train is postponed until morning, then it will distribute mail over a smaller extent of country during the day than if it had started the evening previous, and it will have collected very little more letter mail by the delay; for people do not usually mail letters at night. It will, however, have gained the entire morning newspaper mail, which is a very large amount, and whose earliest possible delivery is of great importance to the people for 500 miles around—of much less importance at greater distances.

The fact that the trip between Chicago and New York as heretofore made requires two nights and a day, and that the elimination of one of the nights does not save any working hours, greatly limits the benefits attainable by increasing the speed of mails, or of passengers, for that matter.

Considering the unprofitableness of mails carried in postal cars, as these fast mails are carried, and the bitter complaint made by the railroad companies at the inadequacy of the pay allowed, it seems strange that they should have consented to an extension of the service, and that coupled with a speed nearly one-half greater and very much more expensive than that heretofore furnished. But it seems that on both roads the separate fast mail train was proposed by the railroad companies themselves. We do not pretend to understand all the motives that led to this action, some of which apparently had no reference to direct gain; but the great weight of some of the trains on the trunk lines, sometimes exceeding the tractive capacity of a single locomotive, may in some cases make it desirable to keep off postal cars; and a division of a train becoming necessary, it might be as well to put the post-office cars by themselves. This, however, will not account for increasing the speed of this postal train. It can attract no custom, for the train takes no passengers; and the price for mail service is the same, whatever the speed.

If a man with an average limited acquaintance with the business of the country were asked to select a route for a special fast mail train between New York and Chicago, he would probably think that the best route would be the shortest and that lying nearest the heart of the country. Now, the route by which the Chicago mails are to go is not the shortest, but the longest; and it lies not through the heart of the country, but much of the way near its northern border. These facts have been put forward as objections to the route, and in some places the Superintendent of Railway Mail Service has been bitterly complained of for having selected such a route.

So far as charges against the Post-Office Department are concerned, there is not much room for blame, even if there has been a blunder. The fast train was offered to it, and the offer extended to but a single route. It certainly should not be blamed for having accepted what was offered, and was at that time the only thing offered.

But if the Department had taken the initiative and selected the route, expecting it to be the sole one on which a fast mail would run, it would probably have chosen this same route, notwithstanding its length. It would have been inclined in this way, because this road, though not through the center of territory or even of population, does run nearer than any other to the center of mail distribution. It has not only more large cities on the line than any other, but it has near it that part of the rural community that receives the most mail. A record of the weight of mail sent from New York westward shows that nearly four times as much went to the country most easily supplied from the New York Central and Lake Shore route to Chicago as went to the country which can better be supplied from the direct route from New York to St. Louis. To the Post-Office Department, the importance of places and routes is in proportion to the amount of mail they take, and not to their traffic, extent of territory, or even population.

The Pennsylvania Railroad Company having offered the Department a fast train, and having its offer accepted, in an incredibly short time built the three post-office cars necessary for the service, and was ready at the beginning of this week to

undertake the service. The Post-office Department was not ready, but in spite of that the train started on the morning of Monday, September 13, carrying newspapers not sent through the post office, and a small excursion party.

The Pennsylvania train as far as Philadelphia, is nearly equivalent to the "newspaper train" that has been run all summer, serving chiefly to supply the New Jersey towns and Philadelphia with the New York morning papers. The schedule from Jersey City to West Philadelphia, 88.63 miles, shows no stop for the whole distance, but the train, like all others, is compelled to come to a halt before crossing the Central of New Jersey Track in Elizabeth. The train leaving Jersey City at 4:35 a. m. reaches West Philadelphia at 7:10, the time being 2 hours and 35 minutes, and the average speed 34.1 miles per hour. On part of the line where there is least obstruction from city crossings, etc., from Elizabeth to Trenton, 42.65 miles, that distance is made in 66 minutes, or at the rate of 38.8 miles per hour.

This road has arrangements to enable the engines to pick up water from New York to Pittsburgh, and trains are compelled to stop only at the ends of divisions, to change engines—at Philadelphia, Harrisburg and Altoona.

The average running time per hour on different divisions is:

	Miles.
Jersey City to West Philadelphia.....	34.10
West Philadelphia to Harrisburg.....	34.00
Harrisburg to Altoona.....	37.71
Altoona to Pittsburgh.....	32.60

The total time from Jersey City to Chicago, 912 miles, is 27 hours and 35 minutes, and the average rate for the whole distance is 33.05 miles per hour.

Beyond Pittsburgh, however, we have not the stops, and the speed given is the effective speed, including stops, which is, approximately:

	Miles.
Pittsburgh to Chicago.....	36.8
Pittsburgh to Columbus.....	31.8
Columbus to Cincinnati.....	28.0
Columbus to Indianapolis.....	30.8
Indianapolis to St. Louis.....	33.3

In order to ascertain just what effect the fast train by the Lake Shore route to Chicago will have, it will be necessary to compare it with the present service, which is but imperfectly done below because the Pacific express there named does not carry the morning newspapers, the fact being that so far as their distribution is concerned the new service is incomparably superior.

What is known as the Pacific express on the New York Central & Hudson River Railroad leaves the Grand Central Depot in New York at 8 p. m. and reaches Chicago at 8:01 a. m. on the second day thereafter, by Chicago time, equivalent to 8:56 New York time. Thus the run of 979 miles is made in 36 hours and 56 minutes, or at the average rate of 26½ miles per hour, including stops.

The new fast mail train leaves New York at 4:15 a. m., and reaches Chicago at 6:36 the next morning—equivalent to 7:31 New York time—thus making the 979 miles in 27 hours and 15 minutes, which is at the rate of 35.9 miles per hour.

The following are the times of arrival of the two trains:

	Miles.	Pacific express.	Fast Mail.
New York.....	0	8:00 p. m.	4:15 a. m.
Poughkeepsie.....	73	10:35
Albany.....	142	1:00 a. m.	7:40
Utica.....	237	4:35	10:00
Syracuse.....	290	6:35	11:15
Rochester.....	392	9:45	1:10 p. m.
Buffalo.....	440	12:40 p. m.	3:00
Dunkirk.....	490	2:00	3:35
Erie.....	528	3:40	4:52
Ashtabula.....	569	5:02
Cleveland.....	623	6:50	7:50
Sandusky.....	683	9:20	9:05
Toledo.....	736	11:05	10:57
Elkhart.....	878	4:15 a. m.	3:07 a. m.
Laporte.....	920	5:50	4:25
Chicago.....	979	8:00	6:35

There is a little discrepancy in the times here between those of the Lake Shore, taken from the company's time-table, and those of the New York Central, copied from the newspapers. The latter shows the arrival of the train in East Buffalo at 3:00 o'clock, New York time, while the Lake Shore train starts at 2:55 by that time.

On the New York Central & Hudson River road the 440 miles from New York to Buffalo are run in 10 hours and 45 minutes, which is at the average rate of 40.93 miles per hour. Excluding stops, the average running time is 43.14 miles per hour, which is good express time in England.

The 539 miles on the Lake Shore road are passed in 16 hours and 20 minutes, which is at the rate of just 33 miles per hour.

The rate of speed is pretty even on the New York Central & Hudson River road, being 41.55 miles per hour from New York to Albany, where the road is almost level and the obstructions by crossings unimportant; while from Albany to Palatine Bridge, 45 miles, on which there is a heavy up-grade, the average speed is about 35 miles per hour; from Palatine Bridge to Syracuse, 92½ miles, 42 miles per hour; from Syracuse to Rochester, 81 miles, 44.2 miles per hour; and from Rochester to East Buffalo, 89½ miles, the speed is a little less than 42 miles an hour—in all cases running time exclusive of stops.

On the Lake Shore road the train westward leaves East Buffalo at 2:35 p. m., Columbus time (equivalent to 2:55 p. m., New York time), and runs 40 miles, to Dunkirk, in 65 minutes, and then makes its first stop. The 48 miles from Dunkirk to Erie are run in 72 minutes—just 40 miles an hour; and the 41 miles from Erie to Ashtabula in 63 minutes. From Ashtabula to Cleveland, 54½ miles, requires 35 minutes, and the 113½ miles from Cleveland to Toledo are passed in 3 hours and 17 minutes, a stop of two minutes being made at Sandusky. From Toledo to Elkhart, 142 miles, the distance is made in 4 hours and 10 minutes, and from Elkhart to Chicago, 101 miles, in 3 hours and 48 minutes.

The great speed, therefore, is chiefly on the New York Central, where a journey 440 miles long is made at the rate, including stops, of 41 miles an hour. This is the best time, we

* This and the times below are Columbus time, 30 minutes slower than New York time, which is given above.

think, ever made by a regular train in this country. It is, however, exceeded by some English trains, but usually on much shorter lines. In England in 1872 the Great Northern Railway express made 76 miles at the rate of 47½ miles an hour, but generally express and mail trains run from 35 to 40 miles an hour.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Rome, Watertown & Ogdensburg.—The Lake Ontario Division has been extended westward 3 miles to a point 15 miles west of Charlotte, N. Y.

Central of New Jersey.—The Long Branch Division has been extended from Ocean Grove southward 3 miles to Ocean Beach, N. J.

Grand Rapids, Newaygo & Lake Shore.—Extended from Newaygo, Mich., north 10 miles to Morgan.

Lake Tahoe.—Completed from Glenwood, Nev., to Clear Creek, 8 miles.

This is a total of 24 miles of new railroad, making 702 miles completed in the United States in 1875, against 1,006 miles reported for the same period in 1874, 2,455 in 1873, and 4,498 in 1872.

THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS will hold its next annual meeting in New York, October 20. The Mutual Life Insurance Association connected with the Brotherhood will meet at the same time.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Connecticut & Passumpsic Rivers.—At the annual meeting in Newport, Vt., Sept. 1, the following directors were chosen: Emmons Raymond, Gardner C. Brown, Amos Barnes, T. P. Redfield, John E. Lyon, Warren K. Blodgett, Alden Spear, Stephen Foster, Lucius Robinson. The last five are new directors, replacing Josiah Stickney, B. P. Cheney, A. Knight, Henry Chase, F. M. Weld, H. Fairbanks, S. S. Thompson and D. R. Sortwell, there being apparently fewer directors than last year. The board elected officers as follows: President, Emmons Raymond; Vice-President, T. P. Redfield; Treasurer, N. P. Lovering; Secretary, E. Cleveland. Mr. Redfield replaces B. P. Cheney.

Massachusetts.—At the annual meeting in Newport, Vt., Sept. 1, the following directors were chosen: R. N. Hall, Sherbrooke, P. Q.; Charles Brooks, Lennoxville, P. Q.; S. Foster, Standen, P. Q.; L. Robinson, Newport, Vt.; T. Lee Terrill, Barnet, Vt.; Emmons Raymond, Thomas Upham, W. K. Blodgett, G. C. Brown, Boston. Messrs. Robinson, Terrill, Blodgett and Brown are new directors, replacing A. Knight, D. R. Sortwell, F. M. Weld and B. P. Cheney. The road is leased to the Connecticut & Passumpsic Rivers Company.

Albany & Susquehanna.—At the annual meeting Sept. 7 the following directors were chosen: Thomas Dickson, Soranton, Pa.; Col. F. Young, Honesdale, Pa.; David Groesbeck, J. Pierpont Morgan, Charles Tracy, New York; Joseph H. Ramsey, Robert H. Frym, Wm. L. Phelps, Albany, N. Y.; Minard Harder, Cobleskill, N. Y.; John Westover, Richmondville, N. Y.; John Cook, Worcester, N. Y.; Arnold B. Watson, Unadilla, N. Y.; Ira E. Sherman, Sidney Plains, N. Y.; Inspectors of Election, Ralph P. Lathrop, Wm. H. Haskell and Abraham V. DeWitt. The road is leased to the Delaware & Hudson Canal Company.

Lafayette, Muncie & Bloomington.—Mr. D. A. Collins, formerly Division Superintendent on the Toledo, Wabash & Western, has been appointed Superintendent.

Western of Alabama.—The new board of managers has elected Col. E. P. Alexander President.

Erie.—Messrs. J. B. Brown, of Portland, Me., and J. L. Walsh, of Philadelphia, have been chosen directors in place of S. L. M. Barlow and Marshall O. Roberts, resigned.

East Tennessee, Virginia & Georgia.—At the annual meeting in Knoxville, Tenn., Sept. 1, the following directors were chosen: R. T. Wilson, Joseph Jaques, C. M. McGhee, S. D. Reynolds, Jos. H. Earnest, R. H. Richards, Dr. W. R. Sevier, Thos. G. Barrett, Wm. C. Kyle, B. C. Jackson, Joseph R. Anderson, John Talbot, M. K. Jessup, Adrien Iselin, W. T. Walters. The only new director is Mr. Walters, who succeeds B. B. Boyd. The board re-elected R. T. Wilson, President; Joseph Jaques, Vice-President and Superintendent; C. M. McGhee, Vice-President; James G. Mitchell, Secretary and Treasurer.

Raleigh & Gaston.—Major George W. Grice, of Portsmouth, Va., has been chosen President of this company and of the Raleigh & Augusta Air Line, in place of Dr. W. J. Hawkins, resigned.

Cairo & Tennessee River.—Mr. W. J. Sykes has been chosen President, in place of Cavitt, resigned.

Newport & Wickford Railroad & Steamboat Company.—The following officers have been elected for the ensuing year: President, George M. Miller; Treasurer, John T. Bush; Secretary, Anthony S. Sherman.

Burlington, Cedar Rapids & Minnesota.—Mr. W. W. Walker having resigned as General Superintendent, that office is discontinued and the duties will be assumed by the General Manager. Mr. W. H. Pettibone is announced as Superintendent, and all communications relating to the Transportation, Machinery and Road departments, will be addressed to him. Mr. Pettibone has been Assistant General Superintendent for some time.

Illinois Midland.—Col. George Dale, of Paris, Ill., has been appointed Receiver by the Edgar County (Ill.) Circuit Court, on application of President Hervey and a number of the creditors.

Western Union Telegraph.—Mr. D. O. Mills, of San Francisco, President of the Bank of California, has been chosen a director in the place of Stillman Witt, deceased.

Utah Northern.—At the annual meeting in Logan, Utah, Sept. 11, the following directors were chosen: M. Thatcher, Brigham Young, Jr., W. B. Preston, Logan, Utah; Lorin Farr, Ogden, Utah; Samuel Smith, Brigham, Utah; M. W. Merrill, Richmond, Utah; John W. Young, Salt Lake City, Utah; L. H. Hatch, Franklin, Idaho; R. M. Bassett, Birmingham, Conn.; Oliver Ames, Boston; Joseph Richardson, Charles M. Schofield, New York; M. Salisbury, Washington.

Indianapolis, Bloomington & Western.—At the annual meeting in Urbana, Ill., September 8, the following directors were chosen: J. C. Short, Danville, Ill.; D. T. Thompson, Pekin, Ill.; W. T. McCormick, Mansfield, Ill.; L. J. Bond, Monticello, Ill.; H. Conkling, Bloomington, Ill.; George Nebeker, Covington, Ind.; B. E. Smith, F. E. Collins, Columbus, O.; C. W. Smith,

Chicago; J. T. Thomas, Philadelphia; C. R. Griggs, W. H. Smith, A. Turner, New York. The new directors are Messrs. McCormick, Conkling, Collins, Thomas and C. W. Smith, who replace F. W. Peck, Wm. Dennison, F. Denny, Jr., J. B. Thompson and J. R. Blossom. The board re-elected B. J. Smith, President; C. R. Griggs, Vice-President; A. P. Lewis, Secretary and Treasurer.

Chicago, Lacon & Keokuk.—W. E. Cook is President and F. Gage Secretary of this company, formerly the Hamilton, Lacon & Eastern.

Helena & Iron Mountain.—At the annual election in Helena, Ark., recently, the following directors were chosen: Dr. T. M. Jacks, J. J. Hornor, Helena, Ark.; J. D. Loundsberry, La Grange, Ark.; H. P. Rodgers, Marianna, Ark.; Wm. H. Howes, W. D. Davis, James Lavesque, Forrest City, Ark.; W. H. Cate, Craighead, Ark.; J. H. Burkholder, Moberly, Mo.; Wm. Bailey, James V. West, Thomas N. Hackett, St. Louis. The board elected T. M. Jacks, President; J. J. Hornor, Vice-President; J. P. Moore, Treasurer; J. Clark, Secretary; F. Trunkley, Land Commissioner.

PERSONAL.

—Messrs. S. L. M. Barlow and M. O. Roberts have resigned their positions as directors of the Erie Railway Company. The board passed resolutions expressing regret at Mr. Barlow's retirement.

—Mr. Daniel McLaren, for some years President of the Cincinnati, Hamilton & Dayton Railroad Company, and previously Superintendent for many years, died at his residence in Glendale, O., Sept. 9, after a painful illness of some length. Mr. McLaren's first experience in railroading was on the Boston & Worcester road, where he ran an engine for several years. In 1849 he went West and was soon after made Master Mechanic of the Cincinnati, Hamilton & Dayton, afterwards being promoted to Superintendent, and then President, from which office he retired last year, after being connected with the company for nearly 20 years.

—Mr. W. D. Cowles, General Freight and Ticket Agent of the Burlington & Missouri River Railroad in Nebraska, died of heart disease, in Omaha, Neb., on the morning of Sept. 7.

—Walter H. Waite, Cashier at the New Orleans office of the New Orleans, St. Louis & Chicago Railroad, left that city suddenly Aug. 27, and a subsequent examination of his accounts showed a defalcation of about \$15,000. It appears that he had been suspected for some time, and an examination of his books was ordered, which led to his sudden flight.

—Mr. Hazleton, Master Bridge Builder of the Connecticut & Passumpsic Rivers Railroad, has resigned his position.

—Mr. Edwin McNeil, formerly a prominent civil engineer, and as such connected with the Erie, the Central of New Jersey, the Delaware, Lackawanna & Western, the Lackawanna & Bloomsburg, the Macon & Brunswick, and other roads, died while on a visit to his son at West Point, Sept. 13. Of late years he had retired from the practice of his profession, and at the time of his death was President of the First National Bank of Litchfield, Conn.

—Col. A. McLaughlin has, it is said, tendered his resignation of the position of Secretary of the Illinois Board of Railroad Commissioners.

—The Pittsburgh Commercial is informed of the resignation of Mr. Mendes Cohen, President of the Pittsburgh, Washington & Baltimore Railroad Company. Mr. Hyndman, now Superintendent of the road, and Vice-President King, of the Baltimore & Ohio, are spoken of as probable successors.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods have been reported by the following companies:

Year ending June 30:	1874-75.	1873-74.	Inc. or Dec.	P. c.
Connecticut & Passumpsic Rivers.....	\$684,849	\$771,902	Dec..	\$87,053 11.3
Expenses.....	457,974	490,112	Dec..	41,838 8.3
Net earnings.....	\$226,875	\$272,790	Dec..	\$46,015 16.9
Earnings per mile.....	4,790	5,323	Dec..	603 11.3
Per cent. of expenses.....	66.86	64.66	Inc..	2.20 3.4
Lake Shore & Michigan Southern.....	\$15,413,858	\$18,345,282	Dec..	\$2,931,424 16.0
Expenses.....	11,085,093	12,432,554	Dec..	1,306,861 11.2
Net earnings.....	\$4,328,765	\$5,912,728	Dec..	\$1,583,963 20.0
Earnings per mile.....	18,118	16,618	Dec..	2,496 16.0
Per cent. of expenses.....	71.59	67.77	Inc..	3.82 5.6
Toronto, Grey & Bruce.....	\$331,538	\$347,744	Dec..	\$16,206 4.7
Expenses.....	258,104	109,191	Inc..	58,913 20.6
Net earnings.....	\$73,434	\$148,553	Dec..	\$75,119 50.6
Earnings per mile.....	2,909	2,415	Dec..	496 16.8
Per cent. of expenses.....	77.88	67.03	Inc..	20.82 36.5
Month of July:				
Cairo & St. Louis.....	\$20,312			
Expenses.....	17,617			
Net earnings.....	\$2,695			
Earnings per mile.....	182			
Per cent. of expenses.....	86.73			
Month of August:				
Atchison, Topeka & Santa Fe.....	\$150,000	\$112,681	Inc..	\$37,319 33.1
Burlington, Cedar Rapids & Minnesota.....	112,759	116,280	Dec..	3,521 3.0
Central Pacific.....	1,532,000	1,322,587	Inc..	209,443 15.8
Ind., Bloom. & Western.....	103,526	144,173	Dec..	40,647 28.2
Kansas Pacific.....	305,139	289,937	Inc..	15,202 5.2
Keokuk & Des Moines.....	67,448	68,309	Inc..	4,139 6.6
Lake Shore & Michigan Southern.....	1,184,500	1,414,818	Dec..	230,318 16.3
St. Louis, Alton & Terre Haute-Bellefonte.....	40,406	50,039	Dec..	9,633 19.3
St. Louis, Iron Mt. & So. Union Pacific.....	287,505	254,280	Inc..	33,275 13.1
St. Louis Pacific.....	1,061,000	1,042,416	Inc..	18,584 1.8

Lake Superior Iron Movement.

The shipments of iron ore and pig iron from the Lake Superior iron region, from the opening of navigation up to Sept. 1, were as follows:

	1875.	1874.	1873.	1872.
Marquette, tons.....	320,922	303,045	17,919	18,164
Escanaba.....	160,128	185,642	10,810	9,439
L'Anse.....	46,737	62,869		
Grand Island.....		5,926	4,835	
Totals.....	527,887	555,582	34,555	32,432
The decrease in iron ore is 23,699 tons, or 4.3 per cent.; the increase in pig iron 2,223 tons, or 6.9 per cent. The decrease in the total tonnage from the district was 21,476 tons, or 3.7 per cent.				
Cotton Rates.				
At a meeting of representatives of the Charlotte, Columbia & Augusta, the Richmond & Danville and the Carolina Central companies in Charlotte, N. C., recently, the following rates on cotton were agreed upon: Charlotte to Wilmington, \$1.60 per bale; to Charleston, \$1.75; to Richmond, \$2; to Norfolk, \$2.25				

Baltimore, \$2.85; New York and Philadelphia, \$3.80; Boston and Providence, \$4.

Coal Movement.

Coal tonnages are reported as follows for the week ending Sept. 4:

	1875.	1874.	Inc. or Dec.	P. c.
Anthracite.....	607,908	460,961	Inc..	116,947 25.9
Semi-bituminous, Broad Top and Clearfield.....	22,131			
Cumberland.....	60,530			
Bituminous, Barclay.....	8,960			
" West'n Pennsylvania.....	43,967			
" West Virginia.....	3,249			
Coke, Western Pennsylvania.....	16,369			

The coal tonnage of the Pennsylvania Railroad for the fourth week in August was as follows:

	Tons.
Anthracite.....	20,722
Bituminous.....	68,296
Coke.....	16,369
Total.....	105,387

Flour and Grain Movement.

For the week ending Sept. 4 receipts and shipments were reported as follows, flour in barrels and grain in bushels:

	1875.	1874.	Inc. or Dec.	P. c.
Lake ports' receipts.....	78,260	105,092	Dec..	26,832 26.5
" shipments.....	96,011	90,215	Dec..	5,796 3.2
Atlantic ports' receipts.....	173,141	218,024	Dec..	44,883 20.6
Wheat:				
Lake ports' receipts.....	1,921,584	1,613,971	Inc..	307,613 19.0
" shipments.....	1,661,879	2,006,090	Dec..	344,201 17.1
Atlantic ports' receipts.....	1,161,963	1,432,261	Dec..	270,298 23.2
Grain of All Kinds:				
Lake ports' receipts.....	4,596,578	3,215,118	Inc..	1,381,460 43.0
" shipments.....	4,631,793	3,826,206	Inc..	805,587 21.1
Atlantic ports' receipts.....	4,145,143	2,435,103	Inc..	1,710,040 70.2

For the week ending Sept. 11 Chicago grain receipts and shipments were:

	1875.	1874.	Inc. or Dec.	P. c.
Receipts.....	1,707,360	1,438,998	Inc..	268,372 22.7
Shipments.....	2,102,769	2,637,606	Dec..	534,837 19.7

Of the shipments of grain from lake ports for the week, 26½ per cent. went by rail this year, against 13 per cent. in 1874, and 24 per cent. in 1873. The movement, though much heavier than for the corresponding week last year, is yet not heavy—when the lake ports received about 7,000,000 bushels of grain that year, and not greatly different from those of the two previous years, when lake ports' receipts were about 4,600,000 and 4,900,000 bushels, respectively.

Petroleum Exports.

For the nine months ending with August the exports have been:

From	1875.	1874.	1873.	1872.
New York.....	93,858,922	102,966,210	88,320,035	55,914,645
Boston.....	1,089,454	2,472,078	1,591,589	1,232,178
Philadelphia.....	34,600,282	51,403,957	52,388,168	34,742,648
Baltimore.....	17,720,732	3,602,967	2,061,744	1,320,164
Total gallons.....	147,869,390	160,415,212	144,381,536	93,899,307

The decrease in total exports since last year is nearly 8 per cent. The exports have decreased 9 per cent. at New York, 39 per cent. at Boston and 33 per cent. at Philadelphia, while they have increased 892 per cent. at Baltimore. Of the total exports the proportions from each port have been:

	New York.	Boston.	Philadelphia.	Baltimore.
1874.....	63.5	1.1	23.4	12.0
1875.....	64.3	1.7	32	2.1

The Delaware Peach Traffic.

The shipments of peaches over the Delaware Railroad for the week ending Sept. 11 were 1,258 car-loads, the heaviest day's work being 241 cars. The total shipments from the opening of the season up to and including Sept. 11 were 6,545 car-loads, or about 436 trains.

ANNUAL REPORTS.

East Tennessee, Virginia & Georgia.

This company owns and works a line from Bristol, Tenn., southwest to Chattanooga, 242 miles, with a branch from Cleveland, Tenn., 25 miles east of Chattanooga, south to Dalton, Ga., 27 miles, making 269 miles in all.

At the close of the last fiscal year, June 30, 1875, the property was represented by the following securities:

Stock (\$7,317 per mile).....	\$1,968,374
Bonds (\$15,620 per mile).....	4,301,900

Total (\$22,937 per mile).....\$6,170,174

The only change from the previous year is the canceling of \$3,000 of bonds by the sinking fund. The floating debt is practically nothing. With a light capital account and no floating debt, the company's financial position is good, and it was last year able to pay 6 per cent. dividends upon the stock, being almost alone among Southern roads in that respect.

During the year 2 engines, 4 passenger and 62 freight cars were rebuilt or renewed, 210½ tons new iron, 1,028 tons rolled iron and 65,543 new ties were bought and used in track repairs, 13 miles of track were ballasted with stone, and an iron bridge, 389½ feet long, built over the Hiwassee River. The cost of these renewals (included in expenses) was \$145,795.65.

The earnings of the road for the year were:

	1874-75.	1873-74.	Inc. or Dec.	P. c.
Passengers.....	\$314,247 71	\$329,812 24	Dec..	\$15,565 53 4.6
Freight.....	670,355 40	706,408 22	Dec..	36,053 82 5.1
Mails, express, etc.....	75,362 54	70,963 50	Dec..	4,399 02 6.2
Total.....	\$1,059,965 65	\$1,117,182 02	Dec..	\$57,216 37 4.6
Working expenses.....	717,522 83	697,404 49	Inc..	20,118 34 2.9
Net earnings.....	\$342,442 82	\$419,777 53	Dec..	\$77,334 71 17.3
Gross earnings per mile.....	3,940 47	4,130 80	Dec..	190 33 4.6
Net earnings per mile.....	1,273 10	1,588 20	Dec..	315 10 17.3
Per cent. of expenses.....	67.09	62.76	Inc..	4.33 7.3

The increase in expenses and the decrease in earnings were alike due to two causes, the damage and interruption to travel caused by the unusually heavy floods of last spring, by which the running of trains was stopped for 18 days, and the continued prevalence of excessively low rates on through business. Local passenger and freight earnings show a small increase, while the decrease on through passenger and freight receipts was \$56,530.86. The earnings per passenger-train mile fell off about 5 per cent., and per freight-train mile 9 per cent.

The disposition of net earnings was as follows:

Interest on bonded debt.....	\$280,814 80
Dividend of April 1, 1875.....	58,899 75
Balance to profit and loss.....	2,748 17
Total.....	\$342,462 82

It has been deemed best not to declare any dividend on the last half year's business, and therefore none will be paid in October.

By the charters under which the road was built the property was exempted from taxes for 20 years from the completion of the road and the capital stock forever. The 20 years' exemption on the Western Division has nearly expired and on the East-

ern division has three years only to run. The exemption of the stock was claimed to include bonds also, but there was doubt as to this, and in order to avoid litigation and also to avoid any future trouble the board has deemed it best to accept the provision of the new tax law, which allows companies to pay to the State 1½ per cent. of the gross earnings in lieu of all other taxation.

In view of the improbability of the completion of the Western North Carolina road by the North Carolina Company, in consequence of legal obstacles, the contract with the latter company was canceled and a sale of all interest in the Western road made to the State of North Carolina, which now owns the whole of the Western North Carolina road and has provided for its extension to Paint Rock, on the Tennessee line, as soon as the legal proceedings can be completed. This company has also agreed to extend the Morristown road from its present terminus at Wolf Creek to Paint Rock, about four miles, by the time the North Carolina road reaches that point. The Spartanburg & Asheville road is also now under construction, and the connection with these lines will doubtless be of much benefit to the East Tennessee, Virginia & Georgia.

The relations with connecting lines continue to be friendly. The continuation of the union of management with the Memphis & Charleston road has proved beneficial to both.

OLD AND NEW ROADS.

The Kentucky River Bridge Contract.

Last week under this head we published a statement that the masonry of this structure had been re-let to a Baltimore firm. The Baltimore Bridge Company writes to us: "This is an error: the Baltimore Bridge Company has the Kentucky River viaduct, and is now at work there. The work re-let to Smith, Dandridge & Co. is the masonry of the Tennessee River bridge, at Chattanooga, which the first contractors were judged unable to take in hand."

Cairo & Vincennes.

The transfer incline of the Cairo & Vincennes Railroad at Cairo, for the transfer of business to the South and Southeast, is now nearly completed. It is built in a substantial manner, and laid with three-rail double track.

The new transfer steamer Junius S. Morgan has already arrived at Cairo, and it is expected that regular transfers of freight and passengers, without change of cars, will be made on and after October 1.

This completes the short line to Galveston, Houston, Dallas, Austin, Marshall and other points in Texas and the Southwest, the route being almost an air-line from Indianapolis to the southwestern terminus of the International Railroad near Austin. Arrangements are being made for a through line of Pullman cars from New York to Galveston by this line.

The distances from Indianapolis are:

To	Miles.	To	Miles.
Cairo, Ill.	274	Dallas, Tex.	593
Little Rock, Ark.	327	Fayetteville, Tex.	591
Texarkana, Ark. and Tex.	372	Hearne, Tex.	542
Jefferson, Tex.	736	Houston, Tex.	1,002
Marshall, Tex.	741	Galveston, Tex.	1,032
Shreveport, La.	781	Austin, Tex.	1,104

At present the all-rail route to Austin is circuitous, as passengers have first to go to Houston or to Hearne and then down the Houston & Texas Central to Hempstead. The extension of the International 50 miles will shorten this distance by 142 miles, making the distance from Indianapolis to Austin 1,022 miles. All these distances are 182 miles greater than the distances from St. Louis to the same points, and 91 miles less than their distances from Chicago. The distances by the shortest routes from New York are 825 miles to Indianapolis, 911 miles to Chicago and 1,063 to St. Louis. Thus the Cairo route from New York to these Texas points is 177 miles shorter than that by Chicago and 56 miles shorter than that by St. Louis. The route is common southward from Poplar Bluff, Mo., the junction of "Cairo Division" with the "Arkansas Division" of the St. Louis, Iron Mountain & Southern Railway; and Poplar Bluff is 166 miles from St. Louis, 348 miles from Indianapolis and 439 miles from Chicago.

In the Cairo route, as in the others, there are two changes of gauge, the lines from St. Louis and Cairo to Texarkana interposing a section of 5-feet gauge between the standard-gauge roads of Texas and the North.

With proper facilities, the Cairo route ought to make a good one for carrying cattle from Texas, which is the largest traffic now yielded by this State.

Nebraska Central & Black Hills.

The question of voting \$140,000 aid to this project or to the extension of the Atchison & Nebraska from Lincoln to Fremont, in Saunders County, Neb., has been decided in favor of the Atchison road. It is said that this will be fatal to the new project.

Grand Rapids, Newaygo & Lake Shore.

The iron is all laid on the extension of this road from the former terminus at Newaygo, Mich., northward 10 miles to Morgan, on the Big Rapids Branch of the Chicago & Michigan Lake Shore road. The road is now 45 miles long, from Grand Rapids north by west to Morgan.

Springfield, Jackson & Pomeroy.

The subscriptions to the stock now amount to \$760,000, and the board of directors has appointed a committee to make arrangements for putting the road under contract.

New York & Canada.

The engineers are now locating a line from West Chazy, N. Y., on the old Montreal & Plattsburg road, by way of Cooperville, to Rouse's Point. This line would give the road two northern termini, one at Rouse's Point, the other at Province Line, three miles north of Moore's Junction.

Milwaukee, Lake Shore & Western.

In the suit of the Union Trust Company against this company in the United States Circuit Court for Wisconsin, an order for the appointment of a receiver was granted Sept. 7. No one, however, has yet been designated for the position.

Midland Pacific.

It is again reported that arrangements have been completed for the extension of this road southwest along the Missouri River, to a connection with the Atchison & Nebraska road, near Reno, Neb.

The Lachine Canal Enlargement.

The time for receiving proposals has been further extended to Sept. 29, in consequence of the continued illness of the engineer, Mr. Page.

Quincy, Alton & St. Louis.

Reports are current that this road will soon pass, by lease or purchase, into the hands of the Chicago, Burlington & Quincy. Negotiations are said to be in progress. The road runs from Quincy, Ill., southeast to East Louisiana, 42 miles, with a branch five miles long, from Fall Creek to the east end of the Hannibal Bridge. The part from Quincy to the Hannibal Bridge

serves to connect the Burlington road with the Missouri, Kansas & Texas, from which it receives considerable traffic.

Chicago, Saginaw & Canada.

The grading of this road is being pushed forward with a view of completing it to the crossing of the Grand Rapids & Indiana this fall. The point of crossing will be at Sand Lake, 28 miles north of Grand Rapids. It is said that the Grand Rapids & Indiana has offered to agree upon exchange of traffic on terms very liberal to the new road. The distance from the present end of the track at Elm Hall to Sand Lake is about 35 miles.

Brunswick & Albany.

Work has been begun on the extension from the present terminus two miles east of Albany, Ga., at the intersection of the Atlantic & Gulf road, to the Flint River in Albany. For some time past the trains, which formerly ran into Albany on the Atlantic & Gulf track, have been obliged to stop at the Junction, the other company having prohibited any further use of its tracks and depot. The extension is to be completed in a short time.

Walden's Ridge.

This company, which has just been incorporated in Tennessee, purposes constructing a railroad from the Cincinnati Southern at Big Emory Gap, or any convenient point in Roane or Morgan counties, by way of Winter's Gap and Coal Creek to Cumberland Gap. The road is to run north and west of the Clinch River and through the valleys at the foot of Walden's Ridge. Henry E. Cotton, John T. McEwen, M. P. McEwen, H. Crumbliss and W. J. Bellerton are the incorporators.

Keating & Karthaus.

This road is said to be progressing favorably, and it is proposed to extend it to near Phillipsburg, in Center County, 25 miles south of Karthaus, Pa. The road, as now projected, is intended to open a coal district and to run from Karthaus, in Clearfield County, northeast down the West Branch of the Susquehanna to the mouth of Sinnemahoning, where connection will be made with the Philadelphia & Erie. From Karthaus to the latter road is about 18 miles.

Indianapolis, Bloomington & Western.

The Receiver, Gen. Wright, has filed with the Court a report covering his transactions up to Aug. 1. He says that at that time of his taking possession it was impossible to judge of the real condition of the road, owing to the season. When Spring fairly opened it was found to be in much worse condition than had been supposed. The iron was worn out, the ties rotten, and it required great care to get trains over the road in safety. The first necessity was to place the road and equipment in repair. The report shows that the Receiver has used in repairs since Dec. 1, 1874, 4,318 tons of new and re-rolled iron rails; 507 tons of steel rails; 524,235 pounds of bolts, spikes and bars, and 71,237 cross-ties, at an aggregate cost of \$242,612.96. The Receiver has contracted for 395 tons of iron rails, and 57,000 pounds of bolts and spikes at a cost of \$22,642.54; making the total cost of materials used and contracted for since Dec. 1, 1874, for repairs and replacements, \$265,255.50. Upon this amount the Receiver has paid \$95,255.50 in cash, and issued certificates for the remainder, of \$170,000. During the Summer the work of repairing was considerably delayed, and damages were sustained by continued rains and high water. The track in many places was badly washed, and several of the bridges were injured or destroyed, so that the operating expenses have been considerably increased. Numerous delays have been occasioned, but no accidents of a serious character have occurred.

When the Receiver took possession there were on the road 1,170 cars belonging to the Western Car Company, the rental of which was \$20 per month, afterwards reduced to \$15. Most of these cars were in very bad repair. After unsuccessful attempts to agree upon modifications of the contract, the Receiver and Western Car Company submitted the question in dispute to two disinterested persons to determine, first, the amount of rental to be paid by the Receiver to the car company from Dec. 1, 1874, to April 1, 1875; second, the condition of the stock Dec. 1, 1874, and what the Receiver ought to contribute to put the stock in condition, the amount previously expended being considered; third, the number of cars to be retained by the Receiver and the rate of rental from April 1, 1875 to April 1, 1876. It was of vital importance that the matter be speedily adjusted in order that the cars might be put in condition for use, and the award of the arbitrators was approved by the Receiver and car company, and submitted to the courts for approval subject to final confirmation in open court. In accordance with the award, which was approved June 4, the receiver proceeded to contract for the repair of 425 cars at three different establishments off the line of road, and took into the shops of the company such cars as could conveniently be repaired there. Up to the present time 462 of the Western Car Company's cars have been repaired and contracted to be repaired at a cost of \$71,302.89. Of the original number of 1,170 cars it was found that five had been destroyed, and they have been rebuilt at a cost of \$500 each.

The Rogers' Locomotive & Machine Works have begun a suit to recover payment for or possession of 28 locomotives now on the road. Under direction of the Court a new contract has been made with the Peoria & Springfield Company for the use of the road from Peoria to Peoria.

The earnings of the road have been so light that only \$39,728.27 could be appropriated, since Dec. 1, for the payments on back pay-rolls. The taxes in Indiana are all paid. In Illinois the collection of the taxes has been prevented by injunctions.

The gross earnings of the road for the eight months from Dec. 1, 1874, to Aug. 1, 1875, were \$720,264.61.

In obedience to the orders of court, the Receiver has issued and arranged for the issue of certificates of indebtedness bearing 7 per cent. interest, as follows: For purchase of steel and iron rails, \$159,000; for purchase of bolts, spikes and splice-bars, \$11,000; for protecting titles to right of way, \$35,000; total, \$205,000. These certificates mature in six, twelve, eighteen and twenty months from date of issue.

Notwithstanding trouble from storms and freshets, the road is now in a safe condition, which is continually being improved. There will probably be a large increase of traffic shortly, owing to the abundant crops of the past season. In order to work the road in the most economical manner, the reduction of the present maximum grade is recommended, at an estimated cost of \$350,000.

Chippewa Falls & Western.

This new road, which has heretofore been worked by the West Wisconsin, was formally turned over by the officers of that road to the local management Sept. 6. The new managers are Messrs. L. C. Stanley, T. C. Pound and H. G. Allen, of Chippewa Falls. Mr. Stanley having immediate charge of the road. The necessary equipment has been procured and put upon the line. The road is 12 miles long, from the West Wisconsin at Eau Claire to Chippewa Falls, Wis.

New Mail Routes.

Mail service has been extended over the new portion of the Frederick Division of the Pennsylvania Railroad, from York, Pa., to Hanover, 19 miles.

Montclair.

The sale of this road under foreclosure of the first mortgage, which was to have taken place Sept. 11, has been postponed to Sept. 25. The postponement was made at the request of a number of bondholders, and on the representation that the

additional time is needed to secure the assent of other bondholders to the plan of purchase and reorganization.

Detroit & Milwaukee.

Mr. C. C. Trowbridge, Receiver, reports as follows for the month of July:

Balance on hand July 1	\$23,870 08
Receipts from all sources	82,013 58
Total	\$105,883 61
Disbursements for all purposes	79,521 21

Balance at close of month.....\$26,362 40

The receipts of the month were \$2,492.37 in excess of the disbursements.

Lehigh & Eastern.

The final survey of this proposed road has been completed. The line is 98½ miles long, from Hazleton, Pa., across the Pocono Mountain, west of Stroudsburg, Pa., into the Delaware Valley, and then up that valley on the western or Pennsylvania side of the river to a connection with the Erie about a mile from Port Jervis, N. Y. The road is intended to be a new northern and eastern outlet for the anthracite coal fields of Pennsylvania.

Southern Minnesota.

The condition of this road is being steadily improved by the present management. New iron has been laid on the curves in the Root River Valley, and guards are being put in at the approaches to all the bridges and trestles.

The road suffered rather severely from the storms of last week. The road-bed was badly washed in places, some of the smaller bridges carried away, besides the washing of culverts and other damage done by the very heavy rains and the high water resulting from them.

Eastern Passenger Rates.

An exchange says: "Tickets from New York to Portland and return by the Worcester & Nashua route are sold at \$11, and tickets to the same city and return by way of Boston are \$12. The regular fare between Boston and Portland being \$3 each way, and the regular fare between New York and Boston \$6 each way, there is a margin of \$6 for scalping operations by the Boston visitor buying a Portland ticket."

Osage Valley & Southern Kansas.

This road was to be sold at auction in Jefferson City, Mo., Sept. 14. It is 25 miles long, from Tipton, Mo., to Bonville, and is leased by the Missouri Pacific and sub-leased to the Atlantic & Pacific.

The sale took place as advertised September 14. It was made under a trust deed given to secure \$200,000 of bonds. John N. Tracy of St. Louis was the purchaser, bidding \$50,000 for the property.

Scioto Valley.

Work has been generally commenced all along the line from Columbus, O., to Chillicothe, and it is expected that regular trains will be running by Dec. 1. The length of this section is about 45 miles.

St. Louis & Manchester.

Efforts are being made in St. Louis to secure the means to build this suburban line. The route now proposed is thus described by the St. Louis Republican: "It will, from the city limits, run on the south side of Tower Grove Park, passing through the Russell coal fields; thence through that portion of the Benoist estate owned by Messrs. Clark; thence along the line of property owned by Wm. H. Benton, Esq.; thence towards Gravois road and through a portion of the White Haven farm, owned by President Grant; then it will take a northwest direction towards the Big Bend of the Meramec, and returning to the city will pass by Rose Hill, Kirkwood, Webster and Forest Park, forming a semi-circle between the Gravois and Clayton and Manchester rock roads."

Cairo & St. Louis.

For the month of July this company reports as follows:

Earnings (\$139 per mile)	\$20,312 40
Working expenses (68.73 per cent.)	17,017 07
Net earnings (\$18 per mile)	\$2,695 33
Extraordinary expenses	2,581 66

Balance.....\$114 67

The train mileage for the month was: Passenger, 10,881; freight, 4,680; coal, 10,371; total, 25,932. The average receipts per passenger-train mile were \$0.7852; per freight-train mile, \$1.2478; per coal-train mile, \$0.5478.

Toledo, Wabash & Western.

The holders of the equipment bonds are, it is understood, taking active measures to enforce their rights, which, they think, are not receiving sufficient consideration, especially from the holders of the general mortgage which it is proposed to foreclose. The position of the equipment bondholders is sufficiently explained by the following paragraph from the circular issued by their committee:

"The total issue of these bonds amounts to \$600,000, and was made in 1863 to provide equipment for the road, as the title indicates. Although, at the time when issued, the equipment bonds were not secured by mortgage on the property of the company, yet by a subsequent issue of bonds made in 1867, known as the Toledo, Wabash & Western Railway Company consolidated mortgage sinking fund convertible bonds, it was stipulated and declared in the indenture of mortgage, authorizing \$15,000,000 of bonds, that there should be retained \$13,300,000 of said bonds to retire all the previous issues of bonds representing the funded debt of the company, whether secured by mortgages or not; and then proceeds to say, 'said funded debt as it now exists, is represented and made up as follows, viz: "

"Bonds of the Toledo & Wabash Railway Company, due May 1, 1883, for the sum of \$600,000, and known as equipment bonds."

"Bonds of the Toledo, Wabash & Western Railway Company, due April 1, 1871, for the sum of \$1,000,000, and known as sinking fund bonds." The last-named class of bonds has been retired by conversion into the consolidated mortgage bonds, in accordance with the provision made in the said indenture.

"The committee having been advised that foreclosure proceedings have been commenced by the holders of the gold interest mortgage bonds issued in 1873, and the directors of the company having failed to entertain the application to exchange the equipment bonds for the consolidated mortgage bonds of 1867, it becomes necessary now to appeal to the courts to sustain us in our rights."

Illinois Central.

The well known Dubuque elevator case, which has been in litigation for years past, and which has been through nearly all the courts of Iowa, has been finally settled, the company having recently paid the sum of \$319,716.28 in satisfaction of the judgments obtained against it in the Supreme Court. As will probably be remembered, the suit arose from a contract under which Mr. Dean Richmond, of New York, advanced a large sum of money to the Dubuque & Sioux City Company, a condition being that all grain coming over the road should pass through his elevator at Dubuque. When the road was leased to the Illinois Central, a connection was made with Chicago and grain began to be sent through in cars, dispensing with any elevator

* Junction with Jefferson Division, Texas & Pacific. † Main Line Texas & Pacific. ‡ Crossing of Houston & Texas Central and Texas & Pacific. § Junction of International and Houston & Great Northern. ¶ Junction of International and Houston & Texas Central.

transfer at Dubuque. Dean Richmond insisted upon the enforcement of the contract and sued the company to recover the \$10,000 that would have been due if his elevator had been used. The elevator was always kept ready for work, and the company was unable to take the manager unawares, though it was often tried. The suits are all decided in favor of Mr. Richmond, and the company at last yielded.

Central Vermont.

The quo warranto suit against the Smith board of directors in the Vermont Supreme Court is to be heard at the session to be held in Franklin County, at St. Albans, in January next. The evidence to be used at the hearing is to be taken in the form of affidavits upon six days' notice thereof, to the adverse parties, or their attorneys, and filed with the clerk of Franklin County on the first day of the next session of the Supreme Court in that county. The Central Vermont Company is ordered to furnish to either party certified copies duly authenticated of any portion of the records of the company relating to the matters connected with the suit.

Monticello & Port Jervis.

The new company formed by the bondholders is called the Port Jervis & Monticello Railroad Company. The company intends to work the road with its own equipment, and has purchased some broad-gauge passenger cars and an engine from the Albany & Susquehanna.

Buffalo & Jamestown.

An injunction has been procured by some citizens of Ellicott, N. Y., to prevent the issue by the town of the bonds voted to this road.

New York, New Haven & Hartford.

A new car shop of brick, with iron roof, has been completed in Hartford, Conn., to replace the one burned a short time since.

Connecticut Central.

The work of laying the track on this road was begun in East Hartford, Sept. 8. Nearly enough rails are now on hand to complete the road, which, it is thought, will take some two months. The work of grading the Rockville Branch is progressing rapidly.

St. Louis & Southeastern.

It is said that there is a fair prospect of a cessation of the war that has been carried on for some time between this company and the Louisville & Nashville. A conference between officers of the two roads was to be held this week.

Hamilton, Lacon & Eastern.

The name of this company has been changed to Chicago, Lacon & Keokuk, and the necessary certificates filed.

The Fast Mail Trains.

The Pennsylvania fast train began its trips September 13, but took no mails on that day, the Post Office Department refusing to send them until the New York Central train also was run. The latter was to begin its trips September 16. The Pennsylvania officers remonstrated against this treatment, claiming that they had only 13 days to make preparations, while the New York Central had had several months, and it was not right to refuse them the mails merely because the other company had failed to get ready. It is freely charged that undue favor has been shown to the New York company in the matter. The Post Office authorities, however, state that Sept. 16 has been fixed as the date of starting for some time, and they did not feel called upon to change it on the motion of the Pennsylvania Company. The Department, indeed, would have preferred to wait for two weeks longer before putting on either train. It has to supply a large force of clerks specially trained in distributing the mails of the route, and this takes a great deal of time, and without the trained force the service will be very imperfect at first. The bulk of the postal-car service has heretofore been on the New York Central route, on which account there is a larger force of ready-trained clerks available for that route at this time. Altogether, between the complaints of railroad officers and those of cities, Mr. Bangs, the General Superintendent of Railway Postal Service, has been pretty well abused, though he only seems to have taken what was offered him in the way of fast trains, and not exercised any choice in the matter of routes.

New York & Oswego Midland.

The argument on the granting of a final decree of foreclosure was to commence before the United States Circuit Court in New York, Sept. 15, but it was understood that a postponement until Sept. 21 would be granted, as the clerk would not be able to complete the arrangement of the proofs in the case until that time. The arguments will probably take some time, as there are a number of parties to the case who must be heard. The Cowdrey Committee since the union with the Opyke Committee claims to control not less than \$5,000,000 of the \$8,000,000 first-mortgage bonds, and probably much more. The Utica Committee has about \$500,000. The holders of the bonds issued under the other mortgages will also be represented by counsel. The Utica, Clinton & Binghamton and the Rome & Clinton companies, whose roads are leased by the Midland, will also be represented and will try, it is said, to have their roads released from their connection with the Midland. The holders of the \$1,500,000 receivers' certificates will endeavor to have the decree provide for their full payment. It will, of course, be impossible to frame any decree that will please all parties, and there is every probability of an appeal by some one from the final decree, and of further tedious and expensive litigation.

Wisconsin Central.

The injunction granted at the suit of George Reed to prevent the issue of any more of the first-mortgage bonds of this company has been vacated by order of the Court.

Rochester & State Line.

At a meeting of parties interested in this road, it was resolved to issue \$500,000 new first-mortgage bonds, the total issue to be limited to \$15,000 per mile, and all outstanding bonds to be retired. It is believed that in this way means can be provided to complete the road.

Erie.

The proposed changes in the board have begun by the retirement of Messrs. Barlow and Roberts and the election in their places of Messrs. J. P. Brown, a sugar refiner, of Portland, and J. L. Walsh, of Philadelphia, who enter the board as representatives of the English bondholders. It is understood that one more change is to be made.

The Cascade Ravine, the embankment across which was washed out a short time since, is to be filled up again. A gravel train and a number of laborers are at work dumping earth and rock from the temporary trestle which now carries the road across. A culvert of ample size will be made for the stream.

President Jewett received from London, by cable, Sept. 15, a proposition signed by "Bond and Shareholders," the address given therein being that of J. M. Bell, care of Wilkinson & Son, 44 Lincoln's Inn, London. After remarking that an assessment on the stockholders would be objectionable and would excite bitter opposition, it proposes that a new issue of common stock be made to the amount of 50 per cent. of the present stock. These shares to be issued to the present stockholders on payment of \$25 per share, which would yield about \$10,000,000. In consideration of the raising of this amount by the stockholders, the bondholders should be asked to

fund two years' interest in securities of the same class as they now hold. Rentals of leased lines to be reduced wherever practicable. The amount available from the new shares and net earnings for two years would be about \$18,000,000, estimating net earnings at \$4,000,000 per year. This sum should then be used as follows: to retire floating debt, \$4,000,000; change the gauge of the road, \$4,000,000; steel rails, \$2,000,000; coal branches, \$2,000,000; second track, new sidings, etc., \$2,000,000; reduction of grades and curves, \$2,000,000; new equipment, \$2,000,000.

The capital of the company would then consist of about \$71,000,000 bonds and preferred stock, and \$117,000,000 common stock. The proposers believe that with the improvements mentioned, the road could earn all the bonded and preferred stock interest, and at least 3 per cent. on the common stock. They also believe that the proposed new stock could be disposed of without any difficulty at \$25 per share.

Rome, Watertown & Ogdensburg.

The track of the Lake Ontario Division has been laid to a point 17 miles west from Charlotte, N. Y., or three miles beyond the point last noted. Tracklaying was suspended some time since for the purpose of ballasting the portion already laid, but will be resumed this week. The erection of the draw-bridge at Charlotte will soon be completed, and the viaduct at Oak Orchard commenced.

Rockford, Rock Island & St. Louis.

The Rock Island (Ill.) *Argus* says: "On inquiry at the general office of the Rockford, Rock Island & St. Louis Railroad here, we learn that the Chicago, Rock Island & Pacific Railroad Company, and the Chicago & Northwestern Railroad Company, have terminated the favorable rates heretofore given the Rockford, Rock Island & St. Louis Railroad Company, on freight for Chicago and the Northwest, and now charge full local rates. This we hear is the result of the injudicious course pursued by Mr. H. Osterberg, agent of the German bondholders, in attacking those roads, and falsely charging, in an interview procured by him, and published in New York newspapers, that the Rockford, Rock Island & St. Louis road had been run in interest of the former road." It is not at all probable that any change of policy has been made for a reason so petty.

Hot Springs Branch.

The grading is advancing rapidly, 13 miles being completed and the long cut being nearly through. The work of laying the track has been begun and will be pushed forward as soon as the construction train is ready.

Boston, Clinton & Fitchburg.

Following the example of nearly all the New England lines, this company has made a general reduction of about 10 per cent. in the salaries of all employees. The reduction took place Sept. 1.

Eastern.

The directors having voted to reduce all salaries 10 per cent. after Sept. 15, a committee of engineers waited on General Manager Hatch to protest against the reduction. He promised to lay the matter before the directors at the next meeting, but could do nothing more.

It is authoritatively stated that the rumors of radical differences of opinion and of serious dissensions in the board are without foundation. There has been no trouble in the board and no dissatisfaction with the management.

Boston & Maine.

In accordance with the request of the Board of Railroad Commissioners, this company will begin to run a cheap train between Reading and Boston October 1. The distance between Boston and Reading is 12 miles, and there are nine intermediate stations. No details of the running of the train have yet been given, but it will probably be run in much the same way as the Eastern cheap train between Lynn and Boston.

A general reduction of wages has been made, as is the case with most of the New England roads. The reduction is about 10 per cent.

Dividends.

Dividends have been declared by the following companies: Union Pacific, 2 per cent., quarterly, payable Oct. 1. Western Union Telegraph, 2 per cent., quarterly, payable Oct. 15. New York Central & Hudson River, 2 per cent., quarterly, payable Oct. 15. Duquesne & Sioux City (leased to Illinois Central), 3 per cent., payable Oct. 15.

Chicago & Northwestern.

The serious damage done to the western section of the Iowa Division by the heavy storms and freshets of last week have been repaired. Through passenger trains resumed their trips Sept. 15, and through freight trains began running Sept. 16.

Chicago, Rock Island & Pacific.

This company has made an arrangement to adjust the suit now pending to recover the internal revenue taxes on surplus earnings under the law of 1870. The amount claimed by the Government was \$931,000, of which the company accounted for all but \$92,000. The company now agrees to pay \$72,128 of this sum, leaving the balance to the judgment of the Court. It is said that the Government will accept the sum offered, but will bring a new suit for the balance.

Kansas Pacific.

A war in a small way recently broke out between this company and the Atchison, Topeka & Santa Fe. The Kansas Pacific began to sell round-trip tickets from Topeka and Lawrence to the Kansas City Exposition at \$1 and 75 cents, including admission to the exposition. Thereupon the Atchison, Topeka & Santa Fe offered a free ride to Kansas City to everyone during the continuance of the fair. It is possible that this may be the beginning of a serious contest, as there is considerable jealousy between the two companies, owing to the efforts made by both to secure the trade of southern Colorado and New Mexico, and especially the Texas cattle trade.

Meetings.

The following companies will hold their annual meetings at the times and places given: Southern, of Long Island, at the office, No. 11 Mercer street, New York, September 20, at 12 noon.

Ohio & Mississippi, at the office, No. 217 West Fourth street, Cincinnati, O., October 14, at 10 a. m., to elect three directors. The transfer books will be closed September 18. Bondholders as well as stockholders vote.

Toledo, Wabash & Western, at the office in Toledo, O., October 6, at 10 a. m.

Morris Canal.

The Lehigh Valley Railroad Company, lessee, gives notice that it will purchase on presentation, at par and accrued interest, the first and second mortgage bonds of the Morris Canal & Banking Company, which mature April 1, 1876.

St. Louis, Kansas City & Northern.

There is a report that this company will build a branch from Lexington, Mo., to Pleasant Hill to connect with the St. Louis, Lawrence & Western, the object being to secure business from the Atchison, Topeka & Santa Fe at Lawrence or Carbondale, the two points where its road connects with the St. Louis, Lawrence & Western. It is exceedingly improbable, however, that the Atchison, Topeka & Santa Fe would send its traffic by any

such route when it owns a line to Atchison and has just acquired one to Kansas City, and it is not likely that the St. Louis, Kansas City & Northern would build the branch to Pleasant Hill merely for the traffic that would come from the Lawrence road.

Boston, Revere Beach & Lynn.

An examination is being made of the route of a proposed extension from Lynn by the head of Nahant Beach, Swampscott and Lynnmore to Salem, a distance of about seven miles.

Burlington & Lamville.

At a special meeting of the stockholders in Burlington, Vt., Sept. 8, it was voted to issue bonds secured by a first mortgage on the road to provide means for its completion.

Springfield & New London.

An assessment of 20 per cent. on all stock subscriptions has been ordered, payable Sept. 20. This makes 50 per cent. in all which has been called in. Work is progressing steadily.

Gilman, Clinton & Springfield.

In the Circuit Court at Bloomington, Ill., Sept. 6, the order came up for the late Receiver, Mr. Hinckley, to show cause why he should not be required to turn over the money balance in his possession. Mr. Hinckley stated that he was ready and willing to give up the balance, provided the Court could relieve him of all liability for obligations incurred by him while Receiver. At his suggestion, the Court made an order that the money be turned over to the master in chancery, and also that all books, papers, vouchers, orders and other documents pertaining to the business of the road under Mr. Hinckley's management be taken from the parties now in possession of the road and placed in the hands of the master, and that the settlement of all the accounts be made by the present and former officers of the road under the master's supervision. This order has been complied with, and the money and papers delivered to the master.

Central, of New Jersey.

The Long Branch Division is now completed and open for travel to Ocean Beach, N. J., about eight miles south of Long Branch and three miles beyond Ocean Grove. Work is progressing rapidly and the road will be completed to Squan Village, five miles further, in a few days.

Lake Tahoe.

This road is now completed and cars are running on it. It is of 3-feet gauge, about eight miles long, and extends from the sawmills at Glenbrook, Nev., on Lake Tahoe, to Clear Creek. Its cost was about \$200,000. It is intended to carry lumber to Clear Creek, whence it is taken by a flume. The road is near the summit of the Sierra and is about the highest railroad in the country.

East Tennessee, Virginia & Georgia.

At the annual meeting in Knoxville, Tenn., Sept. 1, there were present representatives of the Spartanburg & Asheville Company, who made addresses setting forth the great benefits that would result to the East Tennessee road from the completion of the Spartanburg connection. No action was taken in the matter.

The stockholders passed a resolution requesting the directors to declare a dividend at the earliest day consistent with good faith and the financial ability of the company.

The Hoosac Tunnel Line.

The contracts for the new entrance of the State road into Greenfield have been let, sections 1 and 2 to John A. Green & Co., of New York, and 3 and 4 to N. C. Munson, of Boston. The whole amount of the contract is \$361,000. The dispute with the Connecticut River Company as to the crossing of the two roads at Greenfield is to be submitted to referees. The Governor and Council have authorized Manager Prescott to buy an engine and cars for a repair train.

A new contract has been closed with B. N. Farren for the completion of the arching of the tunnel under the new appropriation made by the Legislature. The work of arching and trimming up proceeds at the rate of 275 feet per month. Work on the enlarging of the little tunnel west of the main tunnel is well advanced, and will be finished in two months.

Illinois Midland.

It has been understood for some time that this company was in embarrassed circumstances, although it has been given out from time to time that bonds had been negotiated in England to an amount sufficient to meet its liabilities. The embarrassments, however, have reached a point which rendered it necessary to do something, and the President, Mr. R. G. Hervey, and a number of the creditors applied to the Edgar County (Ill.) Circuit Court for the appointment of a receiver. The petition was granted Sept. 11, and Col. George Dale, of Paris, Ill., appointed Receiver. He immediately filed the necessary bonds and took possession.

The company works a road from Terre Haute, Ind., northwest to Peoria, Ill., 176 miles. Of this, however, it hires the use of eight miles, from Terre Haute to Farrington, from the Terre Haute & Indianapolis, and of 13 miles, from Decatur to Marion, from the Illinois Central. The company was formed about a year ago by the consolidation of the Paris & Decatur and the Peoria, Atlanta & Decatur. The 74 miles from Paris to Decatur were completed and opened in 1871; the sections from Paris to Farrington, 14 miles, and from Decatur to Peoria, 80 miles, in 1874. It is said that the embarrassment will be only temporary.

Boston & New York Air Line.

The Treasurer, Mr. D. B. Hatch, is offering for sale \$250,000 of the issue of \$500,000 new first-mortgage bonds, which, since the foreclosure of the former mortgages, are the only bonded debt of the company. The bonds bear 7 per cent. interest, have 20 years to run, and the proceeds are to be used to put the road in good order and buy necessary equipment.

The contract for repairing the road and putting it in good order has been awarded to Mr. Sidney Dillon.

Securities Admitted on the New York Stock Exchange.

The following securities have been placed upon the list at the New York Stock Exchange:

Lehigh & Wilkesbarre Coal Company, \$15,000,000 consolidated mortgage bonds, guaranteed by the Central Railroad Company of New Jersey.

Chicago, Milwaukee & St. Paul, \$35,000,000 consolidated sinking-fund bonds. This is the new mortgage made, as already stated, to replace the consolidated mortgage of 1874.

Cleveland, Columbus, Cincinnati & Indianapolis, \$7,500,000 consolidated mortgage bonds. In this mortgage, as has been heretofore explained, all the bonded debt of the company is to be consolidated.

Chicago, Rock Island & Pacific, \$1,000,000 new sinking-fund income bonds.

New Orleans, Mobile & Texas.

Mr. F. M. Ames, of Canton, Mass., trustee under the first mortgage of the Western or Trans-Mississippi Division, who is now in possession of the road, has issued a circular which gives the following information:

"The road is now in operation from Westwego (a point opposite the upper portion of the City of New Orleans) to Bayou Goula, 74 miles from New Orleans. All the completed road is near the Mississippi River, and the steamboats on the river are in direct competition for the limited business on this portion of the road. As a result, the earnings are very small, and but

little more than sufficient to pay the running expenses—not sufficient to replace the decayed ties and keep the road-bed and rolling stock in condition. Unless completed to Grand River (11 miles), or some point where it will get additional business, it must be abandoned, or an assessment made on the bondholders to pay for ties and necessary repairs to the road-bed and rolling stock. At Bayou Goula the road leaves the Mississippi River, and goes in an almost direct line for the Sabine River, 153 miles distant, and Houston, Texas. Nearly one-half of the grading and bridging is completed to the Sabine River. About 70,000 cypress ties are out at points reached by navigation on the Grand River.

"The railway with which your road is to make connection at the Sabine River with Houston (known as the Gentry road, and controlled by parties interested with you) is to be completed by July, 1876.

"The plan for reorganization submitted is acceptable to the capitalists and business men of New Orleans. It has been submitted to the United States Circuit Court, and has its sanction. The plan has the approval (with proviso) of your committee chosen Dec. 23, 1874.

"The road was sold in foreclosure on the 18th November, 1874, and purchased for you at the price of \$450,000. The sale was confirmed at the last term of the United States Circuit Court.

"The suits of the State of Louisiana and other parties continued, and it was not until the 5th of June, 1875, that these suits were finally decided in your favor. As the result of this long-continued litigation, \$25,000 will have to be raised to pay expenses.

"Nineteen bonds, issued under the mortgage dated March 15, 1870, are outstanding, and by an order of court each of these bonds will be entitled to one twenty-eighth hundredth part of the amount at which the road was purchased, say about \$100.71 for each bond of \$1,000. The balance of the amount will give \$61.81 as the cash value of the bonds dated Jan. 1, 1872. From these amounts must be deducted the costs of court, sale, legal and other expenses, say \$8.93 on each of the bonds of 1870, and \$3.44 on the bonds of 1872. If the expenses should not, from delay or other causes, exceed \$25,000, the cash value of the bonds will be about \$151.78 and \$58.37 respectively. In order to carry out the proposed plan for reorganization, it will be necessary to make a cash subscription of 10 per cent. on each of the 7,250 bonds (\$725,000), and an assessment to pay expenses (say \$25,000) amounting to \$750,000, or \$103.45 for each and every bond. Every bondholder subscribing that amount for each of his bonds will be entitled to stock to the value of \$375.86. In case any bondholder prefers to take cash for his bonds, other bondholders will be entitled to take the bonds, by paying the cash value, \$58.37, and assessment, \$103.45—\$161.82; for which they will be entitled to \$375.86 in stock that will cost outside parties par in cash.

"It is expected that the proposed cash subscription by the bondholders and the citizens of New Orleans, with the additional stock taken at par by the contractors, will complete the road to the Sabine River. The proposed bond of \$5,000 per mile will purchase the equipment of the road.

"You are requested to notify me, before the 1st day of October, 1875, whether you will subscribe the proportion of the \$750,000 required, or take, say \$58.37 for each bond you may hold."

Northern Pacific.

The Master Commissioner, Kenneth G. White, has submitted to the Court his report of the sale of the road and examination of the claims made under the decree of foreclosure. The sale was made for the sum of \$100,000, as already stated. The claims allowed are as follows:

Jay Cooke, trustee.....	\$7,500 00
Charlemagne Tower, trustee.....	2,500 00
Trustees' expenses for ancillary decrees.....	100 00
A. B. Nettleton, agent of the trustees, for services and disbursements.....	10,085 80
A. B. Nettleton.....	2,078 88
A. B. Nettleton, Conveyancer and Notary Public.....	1,067 00
J. Paul Dyer, Conveyancer and Notary Public.....	250 00
Charles Gibbons, back charges as trustee counsel.....	1,250 00
Oliver Fiske, a master commissioner to make sale.....	15,000 00
Kenneth G. White, a master commissioner to make sale.....	15,000 00
Kenneth G. White, a master commissioner on claims.....	5,000 00
Master Commissioners' expenses for advertising, etc.....	6,500 00
Auctioneer's fees and expenses of sale.....	1,000 00
F. A. Love, complainant's trustee and counsel.....	25,000 00
Geo. W. Case, receiver, services.....	25,000 00
Edward L. Andrews, counsel for co-complainants.....	4,000 00
C. F. Sanford and E. B. Robinson, associate counsel.....	4,076 56
Sanford, Robinson & Woodruff, counsel for trustees in suit of Edna Myers against Company and trustees.....	1,500 00
George Gray, counsel for receiver.....	5,000 00
R. Kennedy Case, trustee for funding interest.....	1,500 00
Henry Stanton, counsel for defendants.....	2,500 00
Court costs and disbursements.....	410 75

Amounting in all to \$137,718.99. Under sections 2 and 4 of the decree but one claim was presented and allowed, that of Baker, Smith & Co., for \$141.97. The item of \$6,500 for advertising, etc., is approximate, all the bills not having been received, but it is believed that they will not exceed the sum stated.

He further reports that the whole amount of first-mortgage bonds appearing by the company's books of coupon and registered bonds and the bond ledger of the trustees to have been bona fide issued, and to be now outstanding and unpaid, is \$29,119,404 of principal, and the amount of interest warrants and coupons which may so appear to be due and owing upon such bonds as may have been bona fide issued, is, up to July 1, 1875, \$4,125,110.36, as near as can be ascertained and computed.

The settlement of the amounts allowed for claims made and for the services of the Master Commissioner and the trustees, counsel and receiver has been made with the knowledge of counsel for all parties in interest, and no objection has been taken.

The Improvements at the Mouth of the Mississippi.

An advisory commission has been in session in New York examining Capt. Eads' plans for the improvement of the passes at the mouth of the Mississippi by the jetty system. The engineers present have been Gen. J. G. Barnard, of the United States Corps of Engineers; Sir Charles A. Hartley, Chief Engineer of the European Commission of the Danube; General B. R. Alexander, United States Engineer in charge of the Government works on the Pacific coast; H. D. Whitcombe, Chief Engineer of the Chesapeake & Ohio Railroad, and of the James River Improvement; Col. W. Milnor Roberts, President of the Philadelphia Water Supply Commission; Gen. T. E. Sickles, Chief Engineer of the Union Pacific Railroad, and G. W. R. Bailey, of New Orleans. Prof. Henry Mitchell, of the Coast Survey, was also expected to attend. These gentlemen have assembled at the request of Capt. Eads, and for the purpose of examining and criticizing his plans and methods of work. They are reported to have approved what has been done.

Atchison Bridge.

This bridge over the Missouri River at Atchison, Kan., the completion and formal opening of which were recently noted, is the property of the Chicago & Atchison Bridge Company, to the stock of which the City of Atchison subscribed \$100,000. The bridge was built by the American Bridge Company of Chicago, Major Gunn being Chief Engineer. It is of iron (rectangular truss), resting on stone piers. It is floored, so as to be used for highway as well as railroad traffic, with sidewalks for foot passengers. The width is 19 feet 6 inches from center to center, the sidewalks being 5 feet on each side. The trusses of the draw are 28 feet high at the ends, and 36 feet in the mid

dle over the pier; the trusses of the fixed spans are 28 feet. The bottom chord of the bridge is 18 feet above the high water of 1844. The bridge consists of a draw-span (on the western side) 382 feet long, giving 160 feet clear water-way on each side, and three fixed spans of 360 feet each—giving a total length of the bridge, including abutments (20 feet), of 1,182 feet. The approaches aggregate only 2,000 feet—1,500 on the east and 500 on the west side, and are earth embankments. The west approach descends so as to reach the street grade at Second street, and the eastern approach descends with a grade of 52 feet per mile, for about a quarter of a mile, where it reaches the level of the railroad tracks on the east side. The draw is worked by a steam engine placed in a small house on an iron platform 20 feet above the floor of the bridge and immediately over the pivot pier. The latches for securing it in place and the other attachments are all worked from this house by the engineer.

Train Accidents in August.

On the morning of the 1st, as a freight train was trying to run two flat cars by a flying switch upon a siding at the east end of the bridge at Towanda, Pa., on the Lehigh Valley road, the switch struck fast when half way over and the cars were thrown from the track, running along with great force against the end of one of the bridge trusses, knocking down two posts and bending several braces, besides damaging the cars. The road was closed eight hours.

On the 1st, the engine of a train on the Evansville & Crawfordville road was thrown from the track near Terre Haute, Ind., and upset, at a place where the road-bed had been washed out by a freshet.

On the night of the 1st, a coal train on the Geneva, Ithaca & Athens road was thrown from the track by a misplaced switch near Ithaca, N. Y., wrecking a number of cars, killing the conductor, and injuring two brakemen. The switch is said to have been purposely misplaced.

Early on the morning of the 2d, on the Grand Rapids & Indiana road, near Grand Rapids, Mich., a train ran into a fallen tree, knocking the smoke-stack and cab off the engine, damaging several cars and throwing one from the track.

Early on the morning of the 2d, a train on the Pittsburgh, Cincinnati & St. Louis road ran into a washed out culvert near Richmond, Ind. The engine upset, and the tender and a box car were piled up on top of it, injuring the engineer and fireman.

On the morning of the 2d, an engine on the Cairo & St. Louis road was thrown from the track on the siding leading to the round-house in East St. Louis, Ill., the road-bed having been washed out by a freshet. The track was covered with water at the time.

Near noon on the 2d, nine cars of a freight train on the Erie Railway were thrown from the track by a broken wheel at Hawthorne, N. J. The cars were badly broken and piled up, and both tracks were blocked five hours. A brakeman was buried in the wreck and killed.

On the 2d, on the Morris & Essex Division of the Delaware, Lackawanna & Western road, near Port Morris, N. J., a number of cars broke loose from a coal train and ran back down a grade and into the head of a following train. A number of cars were wrecked and the engine badly damaged.

On the afternoon of the 2d, an express train on the Baltimore & Potomac road ran into the rear of a stock train at Seabrook, Md., wrecking the engine and several cars, injuring the fireman and killing a lot of stock. It appears that there were two trains at Seabrook, and the siding was not long enough to hold all the cars. A man was sent out to flag the express, but did not go far enough.

On the evening of the 2d, in Indianapolis, Ind., a switching engine of the Cleveland, Columbus, Cincinnati & Indianapolis road was thrown from the track on a siding which had been badly washed by a freshet.

On the evening of the 2d, a coal train on the Geneva, Ithaca & Athens road struck two horses which had got fast in a bridge, and 40 coal cars were thrown from the track, a number of them being badly broken.

On the morning of the 3d, a freight train on the Chicago & Lake Huron road ran into some horses near Flint, Mich., throwing the engine from the track and damaging it badly.

On the morning of the 3d, a mixed train on the Valley Branch of the Baltimore & Ohio struck a rock which had fallen on the track, near Pugh's Run bridge, Va., and the engine and six freight cars ran off the track, several of them being badly broken.

On the 3d, near Galien, Mich., on the Michigan Central road, during a heavy fog, there was a butting collision between two freight trains by which both engines and several cars were wrecked. A new engine for the Union Pacific road, which was on one of the trains, was badly damaged and the man in charge of it was hurt.

On the 3d as a train consisting of an engine and one flat car with a number of section hands was near Timberville, Va., on the Valley Branch of the Baltimore & Ohio, a crowbar fell from the car on the track and threw it from the rails. Several of the men were thrown from the car and five of them hurt. The train was on its return from the wreck of another.

On the night of the 3d a train on the Hannibal & St. Joseph road went through a bridge at Bear Creek, Mo., and the engine man was drowned. The bridge had been weakened by a freshet.

On the morning of the 4th the engine and two cars of a passenger train on the Rome, Watertown & Ogdensburg road were thrown from the track by a misplaced switch near Chaumont, N. Y., injuring the baggage man somewhat.

On the 4th the baggage car of a passenger train on the Northern Pacific road was set on fire by a spark from the engine, when near New York Mills, Minn., and was partially destroyed.

On the 4th, on the New Jersey Division of the Lehigh Valley road, a coal train ran into the rear of a preceding train, wrecking 15 cars and breaking the engine badly.

On the afternoon of the 4th, on the Baltimore & Ohio at Camden Station, Baltimore, a car which was being switched ran into a train which was standing on the track, damaging the front of the engine.

On the night of the 4th a construction train on the Marietta & Cincinnati road was thrown from the track by a wash-out near Stewart's, O., and the engine went down a bank into the Hocking River. Two men were killed and nine hurt.

Very early on the morning of the 5th, at Catlin, Ill., on the Toledo, Wabash & Western road, a switch was purposely thrown wrong, sending an extra engine from the track, wrecking it and killing the fireman and engineer. It is supposed that the intention was to wreck the passenger train, but the extra running just ahead of the passenger train, and the engine and probably saved many lives, although, as it was, two of the best men on the road were killed. The company subsequently offered \$1,000 reward for the person or persons who misplaced the switch, and the employees of the road, having raised the amount, offered another \$1,000.

On the evening of the 5th, as an excursion train on the Southern Railroad of Long Island was going on a siding at Rockaway Beach, N. Y., the rear car was thrown from the track by a defective joint, blocking the road several hours.

On the night of the 5th a train on the Nashville, Chattanooga & St. Louis road ran into a lot of mules near Gleason, Tenn., and the engine was thrown from the track.

Early on the morning of the 6th, a passenger train on the Memphis & Charleston road struck two heavy planks which had been laid across the track near Bailey's, Tenn., and the en-

gine and baggage car were thrown from the track and badly broken. The engineer was fatally injured and the fireman less seriously hurt. Two colored men were subsequently arrested for placing the obstructions.

On the evening of the 6th, an engine on the Shore Line Division of the New York, New Haven & Hartford road ran off the track in New London, Conn.

As a party of men were returning on a car from clearing the track, they were run into by a train, their car was wrecked and one of the men badly hurt.

On the 8th, a temporary trestle erected to replace a bridge over White River, near Martinsville, Ind., on the Indianapolis & Vincennes road, which had been carried away by a freshet, gave way and an engine and baggage car went down into the river.

On the morning of the 9th, the engine and two cars of a mail train on the Memphis & Charleston road were thrown from the track near Big Hill, Miss., by running over two oxen which were on the track. The engineer and baggage master jumped and were somewhat hurt.

On the morning of the 10th, as a freight train on the Chesapeake & Ohio road was passing through Great Bend Tunnel, near Hinton, W. Va., the engine struck a rock which had fallen upon the track and was thrown against the side of the tunnel, breaking several supporting timbers and letting down a mass of earth and rock. The fireman was killed and the engineer badly hurt, being rescued after several hours' close confinement, as he was pinned to the floor of the cab by a heavy timber from the tunnel roof. The road was blocked a whole day.

On the afternoon of the 10th, a passenger car of a train on the Denver, South Park & Pacific road was thrown from the track near Morrison, Col., and one man was thrown from the car and killed. Four passengers were badly hurt and a number bruised.

Very early on the morning of the 11th, five cars of a freight train on the Keokuk & Des Moines road were thrown from the track by a wash-out, near Black's Bluff, Ia. Two of the cars went down the bank and upset, killing some stock.

Early on the morning of the 11th, a car broke loose from a freight train on the Oil Creek & Allegheny River road, near Union Junction, Pa., and a few minutes afterwards a following freight train ran into it, throwing the engine from the track, and damaging the car.

On the morning of the 11th, as a train was going up the incline at Cairo, Ill., on the Cairo & St. Louis road, three cars broke loose, ran back to the depot and into a passenger train which was standing on the track, damaging the engine somewhat.

On the morning of the 11th, six cars of a coal train on the New York Division of the Pennsylvania Railroad ran off the track near the Chestnut street depot, in Newark, N. J. The cars were badly broken, and a brakeman was caught between two of them and severely injured.

About 6 o'clock on the evening of the 11th, on the track used by both roads in common, near Kansas City, Mo., a butting collision took place between a St. Louis, Kansas City & Northern stock train and a Hannibal & St. Joseph special, the latter containing a number of railroad officers. Both engines and a number of cars were demolished, a lot of stock killed, while Superintendent Lee, of the Hannibal & St. Joseph, had his collar-bone and one arm broken. Mr. Stevens, the General Manager of the road, Messrs. Harris and Perkins, of the Chicago, Burlington & Quincy, and the conductor of the train were badly bruised.

On the evening of the 11th a mixed train on the Burlington & Southwestern road struck the body of a horse which had been killed by a preceding train and left lodged in a bridge over Indian Creek, near Farmington, Ia. The engine and nine cars left the track, the engine falling some 10 feet to the ground, while the cars were piled up over it. The track and bridge were so badly damaged that it took a day and a half to repair them.

On the morning of the 12th a freight train on the New York Central & Hudson River was thrown from the track by a misplaced switch at Oneida, N. Y. Two cars loaded with corn were wrecked and two others much broken.

On the evening of the 12th the engine of an express train on the Southwestern Division of the Chicago, Rock Island & Pacific road was thrown from the track near Cameron, Mo., by a piece of a rail which had been laid across the track, evidently with the object of wrecking the train.

On the evening of the 12th, on the Western Railroad of Alabama, near Matt's Mill, Ala., eight cars of a freight train were thrown from the track by a stick of wood which fell from the tender. The cars were badly broken, the track torn up for 100 yards, and the road blocked all night.

On the 13th several freight cars of a mixed train on the Athens Branch of the Georgia Railroad were thrown from the track near Athens, Ga., by the spreading of the rails, which is said to have resulted from the softening of the road bed by long continued rain.

On the afternoon of the 13th the engine of a passenger train on the Montclair Railroad was thrown from the track in the deep cut at Kearney, N. J., where a large quantity of earth had been washed down upon the track by a heavy storm.

On the afternoon of the 13th the boiler of a switching engine on the Fitchburg Railroad exploded while the engine was standing in the Charlestown yard. The engine was torn to pieces, the fireman fatally and two others slightly hurt. Pieces of the engine were scattered in every direction, some falling nearly a quarter of a mile away. The engine was a four-wheeled switching engine, ten years old, and built by McKay & Aldus. No special cause for the explosion has been found, but it is said that the quality of the iron in the boiler was poor.

On the evening of the 13th, during a heavy thunder-storm, a west-bound freight train on the New York Division of the Pennsylvania Railroad ran into the rear of another which was standing on the track at Holmesburg Junction, Pa., wrecking eight cars and damaging the engine. The proper signal was out, but the storm prevented it from being seen.

On the evening of the 13th a passenger train on the Rockaway Branch of the Southern Railroad of Long Island was thrown from the track near Far Rockaway, N. Y., by the spreading of the rails. After running a short distance on the ties a truck wheel broke and the engine pitched over on its side, when the baggage car was forced up on the tender, breaking both badly. The engineer and fireman jumped and were somewhat hurt. The train was said to be in very bad condition.

On the night of the 13th a freight train on the California Pacific road broke in two, and the detached section afterwards ran into the forward part of the train, wrecking five cars loaded with wheat.

On the night of the 13th, near Cornwell's, Pa., on the New York Division of the Pennsylvania Railroad, a section of a peach train ran into the rear of the preceding section, damaging several cars.

Very early on the morning of the 14th an express train on the Ohio & Mississippi road, consisting of the engine, two express cars, two day and three sleeping coaches, was thrown from the track near Huron, Ind., where a rail had been displaced from the track, about 50 feet from a small bridge over Beaver Creek, and just at the end of a sharp curve. The engine, tender and three first cars left the track altogether, the engine and tender going down into the creek, the first express car passing over them and landing against the further bank completely wrecked, the other two cars stopping on the edge of the bank, while of the four remaining cars two ran across the bridge on the ties, being held in by the guard timbers, and the other two stopped short of the bridge and did not leave the

track at all. The engineman and fireman went down with the engine and were badly hurt. The displaced rail was found some 50 feet away. A man who happened to be walking along the track saw the break and tried to signal the train, but was too late; he was arrested on suspicion, but proved to be innocent. It is thought the intention was to rob the train and the company offered \$500 reward for the guilty parties.

On the morning of the 14th the engine and six cars of a freight train on the Wilmington & Weldon road ran into a washed out culvert near Goldsboro, N. C., and were badly wrecked.

On the 14th an express train on the South Carolina Railroad was thrown from the track near Branchville, S. C., by a broken rail. One car was upset and several others badly broken.

On the 14th several cars of a freight train on the Wilmington & Reading road were thrown from the track at Mortonville, Pa., and some of them went down a high bank.

On the afternoon of the 14th, as the mail train on the Ohio & Mississippi was pulling out of a siding at Logansport, Ind., it ran into the rear car of an express train which was standing on the main track. The mail agent, becoming frightened, jumped from his car and was killed.

About 9 o'clock on the evening of the 14th, a freight train on the Indianapolis & St. Louis road ran over a horse near Nokomis, Ill., and the engine and seven cars were thrown from the track and down a bank, the tender being thrown on top of the engine, killing the engineman.

On the evening of the 15th, a car in a freight train on the Erie Railway ran off the track near Rutherford Park, N. J.

On the night of the 15th, a train on the Houston & Texas Central ran off the track near Brenham, Tex. Six cars left the track, and three of them were badly wrecked and a brakeman was killed. The road was blocked all night.

Early on the morning of the 16th, on the Flint & Pere Marquette road, near Flint, Mich., there was a butting collision between a passenger train and a wild engine, by which both engines were completely wrecked, a brakeman and a conductor killed and four others badly hurt. There was a thick fog at the time, which prevented the trains from seeing each other. It is said that the special was running without orders and at a very high speed, hoping to reach Flint before the passenger train started.

Near noon on the 16th, as a passenger train on the Lehigh Valley road was approaching Packerton, Pa., the parallel rod broke, and the end whirling around smashed in one side of the cab. A man who was riding on the engine, sitting in the fireman's seat, was thrown to the ground, run over and killed.

Very early on the morning of the 17th an express train on the Marietta & Cincinnati road, while running at high speed near Athens, O., ran into a caboose and two cars which had broken loose from a preceding freight train and had no one on board. The engine and three cars were badly wrecked and the road blocked five hours. The engineman and fireman both jumped and were badly hurt.

Early on the morning of the 17th an express train on the Grand Trunk road ran over a horse at Holden Crossing, near Detroit, Mich., and the whole train, except the last car, left the track. The engine upset into the ditch; the baggage car was thrown at right angles to the track with one end of the first passenger car resting on it. The fireman was badly scalded and the engineman hurt.

On the morning of the 17th, on the St. Joseph Branch of the St. Louis, Kansas City & Northern road, near Castle, Mo., a trestle work over a dry branch gave way under a passenger train. The engineman felt the trestle sinking and opened his throttle wide, carrying the engine across safely, but the coupling gave way and all the cars went down 25 feet into the ravine. The cars were completely destroyed and broken up, and of 60 persons on the train one was killed, two others hurt so that they afterwards died and no less than 43 were less severely injured.

On the morning of the 17th, on the Central Railroad of New Jersey, in Elizabeth, N. J., a local train ran into the rear of another, which was backing out of a siding. The locomotive and two cars were badly broken.

On the afternoon of the 17th as an engine on the Queen Anne's & Kent road was running upon the turn-table at Townsend, Del., it ran off the track, breaking down the table and falling into the pit.

On the morning of the 18th the engine and seven ore cars of a train on the Virginia & Truckee road were thrown from the track by a misplaced switch at Mound House, Nev. Several of the cars were badly broken and the road blocked about four hours.

On the morning of the 18th the steamboat train from Norwich having failed to connect at Worcester, Mass., with the White Mountains express on the Worcester & Nashua road, a special train was started from Worcester to overtake the express, which was notified to wait for it at Clinton. When three miles out the special ran into the rear of a freight train, wrecking its own engine and nine freight cars and blocking the road some hours.

On the morning of the 18th, as a mixed train on the Rome Branch of the New York & Oswego Midland was crossing the swing bridge of the canal at Clinton, N. Y., the bridge, which was not properly fastened, was jarred from its place and the passenger car ran off the track. The car ran against the end of the bridge truss and was much broken, while the ties and stringers of the bridge were nearly all torn from their places.

About noon on the 18th a passenger train on the Hartford, Providence & Fishkill road went into a washed out culvert near Waterville, Conn., wrecking the engine and hurting the engineman and fireman badly.

On the 18th the mail train on the Atlantic & Gulf road ran off the track near Statenville, Ga., wrecking two cars and injuring the mail agent.

On the 18th a train on the St. Louis, Keosauqua & St. Paul road ran off the track near Keosauqua, Ia. The road is new and in very poor condition.

On the night of the 18th, at Melmine, Ill., on the Toledo, Wabash & Western, a brakeman threw a switch wrong, and the engine and first car of a freight train ran off, the engine turning over. The train was delayed six hours.

Early on the morning of the 19th a freight train on the Delaware, Lackawanna & Western road ran off the track near Tobyhanna, Pa., and 16 cars went into the ditch, blocking the road several hours.

On the afternoon of the 19th, an extra train on the Burlington & Southwestern road left two flat cars on the track at Howland, Ia., intending that the passenger train, which was just behind, should push them into the siding. The cars, however, started off down the grade, attaining a high speed, and ran into the passenger train, running right up upon the engine and damaging it badly.

On the evening of the 19th, near Kalamazoo, Mich., on the Michigan Central road, the tender and baggage car of a train were thrown from the rails by a boulder which had been placed on the track. Another attempt was made to wreck a train the same night at the same place.

Early on the morning of the 20th, an east-bound freight train on the Baltimore & Ohio ran over a misplaced switch and into the head of a west-bound freight, which was standing on a siding at Roseby's Rock, West Va. Several cars were broken up. The train-men claim that they set the switch right and that it was purposely misplaced afterward, probably out of revenge, by some tramps whom they had driven from the train.

Near noon on the 20th, near Rahway, N. J., on the New York Division of the Pennsylvania road, an axle broke under the engine of a Lehigh Valley train, delaying the train some time.

About noon on the 20th, as a special train on the Bennington

& Glastenbury road was running up a steep grade from Bennington, Vt., it came into collision with a car which was running down the grade at a very high rate of speed. This car was badly damaged and a man who was on it was seriously hurt.

On the 20th, a working train on the Central Railroad of New Jersey ran into the rear of a freight train which was standing on the track at Lebanon, N. J. A car was thrown up against the depot, crushing in one side of the ticket office.

On the 20th a freight train on the Chicago, Burlington & Quincy road broke in two near Hinsdale, Ill., on a down grade. The engineman put on brakes, when the detached portion of the train ran into the forward section, wrecking five cars loaded with wheat.

On the afternoon of the 20th there was a butting collision between a wild engine and an express train on the Bensselaer & Saratoga road near Mechanicville, N. Y., by which both engines were badly wrecked and the baggage car had one end driven in by the tender. The engineman of the wild engine thought he had time to reach the Mechanicville switch before the express was due.

On the afternoon of the 20th a west-bound express on the Baltimore & Ohio road ran over a cow near Belton, West Va., and the engine and three cars were thrown from the track and down a high bank. The engine turned over several times and was completely wrecked. The fireman was killed, the engineman badly and two postal clerks less seriously hurt.

On the evening of the 20th the engine of a train on the New York Division of the Pennsylvania road was thrown from the track at the Hamilton street crossing in Newark, N. J., by a small stone which had gotten wedged in between the rail and the roadway planking. Trains were delayed half an hour.

On the 21st, as a freight train on the Northern Pacific road was crossing the bridge over the Mississippi at Brainerd, Minn., a brake-beam dropped from a foreign car which was on the train, threw it from the track and tore out the ties for 10 or 12 feet. Little other damage was done to the bridge, which is a pile bridge built since the destruction of the truss bridge there some weeks before.

On the 23d a train on the Cairo & St. Louis road ran into some flat cars which had been left standing on the main track at Gillsburg, Ill., and the engine was badly damaged.

On the afternoon of the 23d there was a collision between a freight and a working train on the Burlington & Missouri River road, near Tyrone, Ia., by which nine cars were badly broken, the boss of the work train hurt and the track blocked eight or nine hours.

On the night of the 23d an excursion train returning from Geneva Lake to Freeport, over the Chicago & Northwestern road, while running at high speed, five miles east of Rockford, Ill., struck a cow which had got fast in a cattle-guard. The engine, tender, baggage and two passenger cars were thrown from the track and the engine and one car were badly broken. Although the cars were very much crowded, only three passengers were badly hurt.

On the night of the 23d an engine ran into the head of a coal train on the Morris & Essex Division of the Delaware, Lackawanna & Western road in the yard at Port Morris, N. J., damaging both engines badly and blocking the road so that a temporary track had to be laid around the wreck.

Very early on the morning of the 24th, as a coal train was running over this temporary track, the switch was thrown out of place and a number of coal cars ran off the track.

On the morning of the 24th, near Hinsdale, Ill., on the Chicago, Burlington & Quincy road a freight train broke in two and the two sections afterwards came together, wrecking six cars loaded with wheat and blocking the road some time.

On the morning of the 24th an extra freight train on the Toledo, Peoria & Warsaw road ran into a lot of stock near New Philadelphia, Ill., killing several and throwing four cars from the track. The road was blocked several hours.

Near noon on the 24th, on the Morris & Essex Division of the Delaware, Lackawanna & Western road, in the Port Morris yard, there was a butting collision between a coal and a freight train, by which both engines were wrecked and a fireman killed. This was the third accident at the same place within 24 hours.

On the morning of the 25th several cars of a train on the Paris & Danville road were thrown from the track near Hutsonville, Ill., by the spreading of the rails, and three of them went down a bank 12 feet high and were completely wrecked.

On the morning of the 25th, on the Keokuk Branch of the Chicago, Burlington & Quincy, in Keokuk, Ia., a freight car was started down a grade to run to a siding. The brakes, however, failed to hold on and it ran into the passenger car of a mixed train, which was standing on the track, breaking it a good deal.

On the night of the 25th, an express train on the Sioux City & Pacific road went through the bridge over Thompson Creek, near Sioux City, Ia., one abutment of which had been washed out by a freshet. The engine went into the creek, and the baggage and passenger car piled up on top of it, leaving the sleeping car standing on the track. The conductor, engineman and fireman were killed and four passengers badly hurt.

On the 26th, an express train on the Erie Railway ran over a misplaced switch near Corning, N. Y., and into the head of a coal train which was lying on the siding. Both engines were badly wrecked and the mail, baggage and two passenger cars were thrown from the track, blocking the road several hours.

On the afternoon of the 26th, a switch engine on the Philadelphia, Wilmington & Baltimore road ran off the track as it was going into a coal siding in Wilmington, Del.

On the night of the 26th, as a freight train on the Keokuk & Des Moines road was backing into a siding at Fishville, Ia., four cars were thrown from the track by the spreading of the rails. Two of them ran into such a position as to obstruct the main track, which was blocked three hours.

Very early on the morning of the 27th, a section of a peach train on the New York Division of the Pennsylvania Railroad ran into the rear of a preceding section at Elizabeth, N. J. The engine was badly damaged, several cars wrecked, and there was an extensive distribution of fruit.

On the 27th, a train on the Central Railroad of Georgia ran off the track, blocking the road some time.

On the afternoon of the 27th a Toledo, Wabash & Western engine ran into a Peoria, Pekin & Jacksonville freight train at the crossing of the two roads in Jacksonville, Ill. A tender and several cars were badly broken.

On the afternoon of the 27th, on the Wheeling, Pittsburgh & Baltimore Branch of the Baltimore & Ohio, in Wheeling, W. Va., a car of a mixed train ran off the track.

On the evening of the 27th, as a passenger train on the Chicago & Michigan Lake Shore road was approaching Chikaming, Mich., it was thrown from the track by a misplaced switch and the engine and several cars were badly damaged. The fireman was somewhat hurt. It was found that the switch lock had been broken and the switch purposely set wrong.

Near noon on the 28th a freight train on the Worcester & Nashua railroad was thrown from the track at Pepperell, Mass., and six cars were badly wrecked. The accident is said to have been caused by a broken switch rod.

Very late on the night of the 28th, on the Dayton & Michigan road, near Toledo, O., a wheel broke under a car in a freight train and 17 cars were thrown from the track and badly wrecked. The road was blocked several hours.

On the afternoon of the 29th two cars of a passenger train on the Savannah & Charleston road were thrown from the track near Hardeeville, S. C., blocking the road several hours. The accident was caused by the spreading of the rails.

On the evening of the 29th a passenger train on the Louisville, Harrod's Creek & Westport road was thrown from the track by a misplaced switch in Louisville, Ky. The engine went down a low bank against a tree, and was somewhat damaged.

Early on the morning of the 30th a freight train on the Grand Trunk Railway crossed the bridge over the Richelieu River at Beloeil, P. Q., and immediately afterwards the draw was opened to allow a boat to pass. Just then, as the train was going up the heavy grade leading from the bridge, a coupling broke and 11 cars loaded with grain ran back down the grade and went through the open draw into the river.

On the morning of the 30th, as a coal train on the New Jersey Southern road was backing upon a siding, at Long Branch, N. J., it ran over and killed a passenger who had just stepped from a train on the other track. The rear car was thrown from the track and ran into a passenger coach, doing some damage.

About noon on the 30th a passenger train on the Lehigh & Susquehanna Division of the Central Railroad of New Jersey ran into the head of a coal train which was just backing into a siding at Reichard's Hill, near Allentown, Pa. Both engines and a number of coal cars were wrecked and two passenger cars badly broken. One passenger was injured. The accident is said to have been caused by the neglect of the flagman at that point to display the proper signal.

On the afternoon of the 30th, near Kit Carson, Col., on the Kansas Pacific road, an ash-pail door dropped upon the rails, throwing the tender, mail and baggage car from the track, and blocking the road five hours.

On the evening of the 30th an express freight train on the Morris & Essex Division of the Delaware, Lackawanna & Western road was thrown from the track in Newark, N. J., by a misplaced switch. The engine ran upon a retaining wall about four feet high, which there bounds the road-bed and toppled over into the street, falling on its side and breaking itself badly. Several cars also left the track and the tender was much damaged.

On the evening of the 30th a passenger train on the New Jersey Southern road ran into the rear of a freight train which was just going upon a siding at New Lisbon, N. J. The engine was thrown to one side of the track into a sand heap.

On the night of the 30th, two cars of a freight train on the St. Louis, Iron Mountain & Southern road, ran off the track in Carondelet, Mo., blocking the road some time.

Late on the night of the 30th, there was a collision between two freight trains on the Great Western Railway, at Baptiste Creek, near Chatham, Ont. An engine and several cars were wrecked.

On the night of the 31st, a freight train on the Texas & Pacific Railroad was thrown from the track at Longview, Tex., and a brakeman was killed.

On the night of the 31st, a freight train on the Southern Minnesota road ran into a wash-out near Preston, Minn., and a number of cars went into the ditch.

This is a total of 114 accidents, whereby 27 persons were killed and 110 wounded. Twenty accidents caused death, 20 injuries less than death, while 74, or 65 per cent. of the whole, caused no injury serious enough to be recorded.

These accidents may be classified as to their nature and causes as follows:

COLLISIONS:	
Rear collisions.....	19
Butting collisions.....	13
Crossing collisions.....	1
Unexplained.....	2
	35

DERAILMENTS:	
Unexplained.....	14
Misplaced switch.....	10
Wash-out.....	10
Cattle on track.....	10
Accidental obstruction.....	9
Spreading of rails.....	5
Broken bridge or trestle.....	4
Malicious obstruction.....	4
Broken wheel.....	2
Broken rail.....	1
Broken axle.....	1
Broken switch rod.....	1
Defective joint.....	1
Bad track.....	1
Flying switch.....	1
Open draw.....	1
Draw unsecured.....	1

Car burned and well running.....	1
Boiler explosion.....	1
Broken connecting rod.....	1
	3

Total.....114

Seven collisions were caused by the breaking in two of trains, three apparently from the absence of signals or failure to use them, two by misplaced switches and two by failure to see signals during a storm. Besides the three malicious obstructions there were four accidents caused by switches being purposely misplaced with intent to make trouble. Twenty-seven accidents were caused by defects or failures of road or equipment. Cattle on the track, as usual in summer, were responsible for a number of mishaps.

The number of accidents is very large, and has been equalled only during the three months of the last very severe winter. The great rain-fall and the unusually severe and frequent storms of the month are doubtless the cause. Besides the accidents directly resulting from wash-outs, three of the broken bridges or trestles recorded failed from the same cause, and the unusual number of cases of spreading of track doubtless came from the softening and washing of the road bed by heavy rains. It is possible, too, that some of the many collisions resulted from the general confusion and disarrangement of trains caused by loss of bridges and breaks in the road. As compared with August of last year there is an increase in accidents of 41, or 56 per cent., an increase in the number killed of 11, or 69 per cent., and in injured of 33, or 43 per cent.

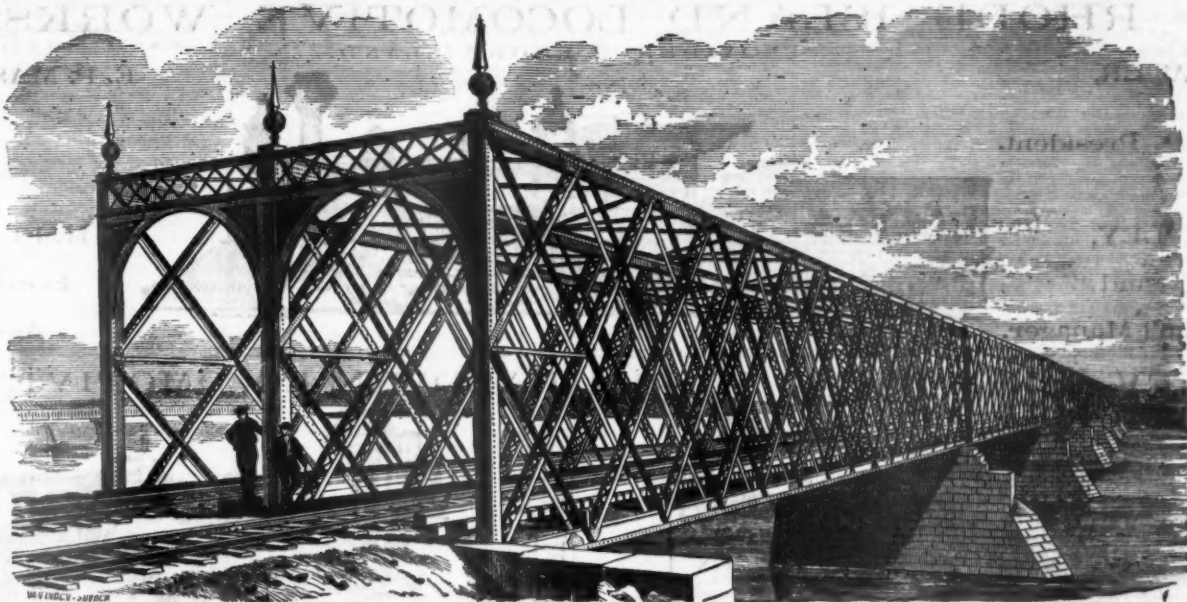
For the year ending with August the record is as follows:

	No. of accidents.	Killed.	Injured.
September.....	89	27	106
October.....	81	16	60
November.....	83	13	60
December.....	74	10	49
January.....	131	10	108
February.....	211	11	73
March.....	122	9	67
April.....	60	6	67
May.....	54	6	67
June.....	61	29	50
July.....	73	33	110
August.....	114	27	110
Totals.....	1,162	204	975

The averages per day were for the month 3.68 accidents, 0.87 killed, and 3.55 injured; for the year they were 3.16 accidents, 0.56 killed, and 2.67 injured. The averages for the month exceeded those for the year in accidents by 16.5 per cent., in killed by 55.4 per cent., and in injured by 33 per cent.

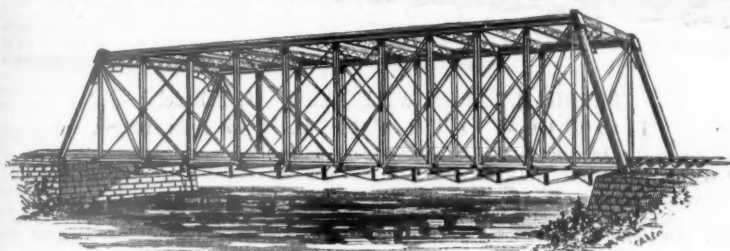
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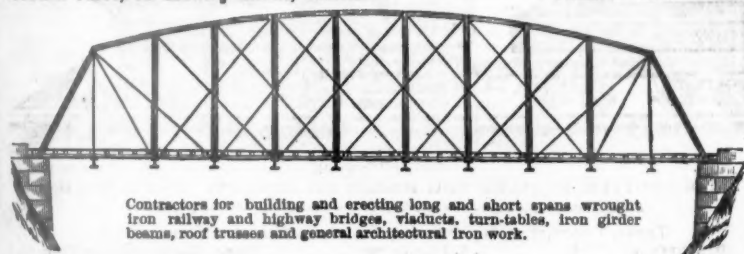
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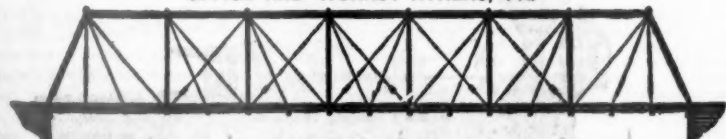
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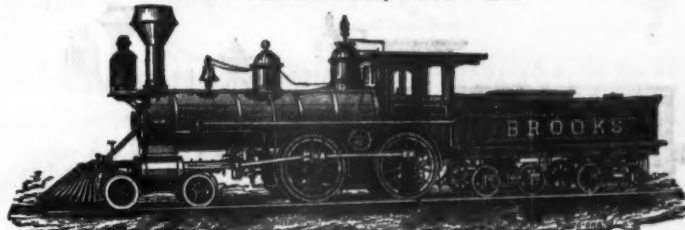
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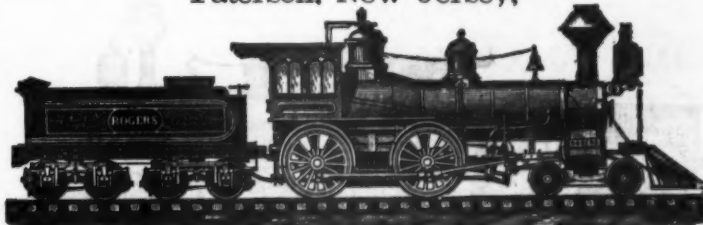


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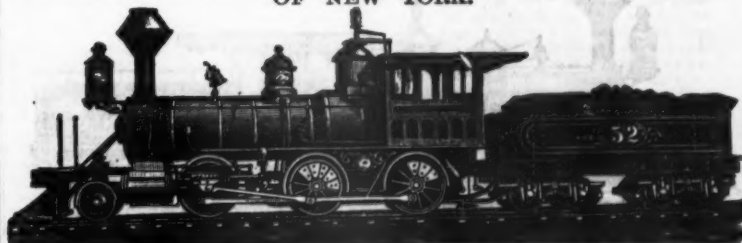
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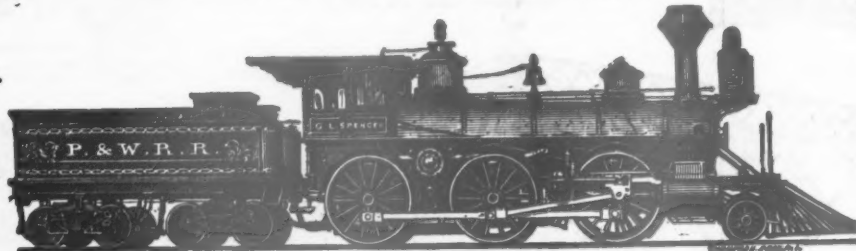
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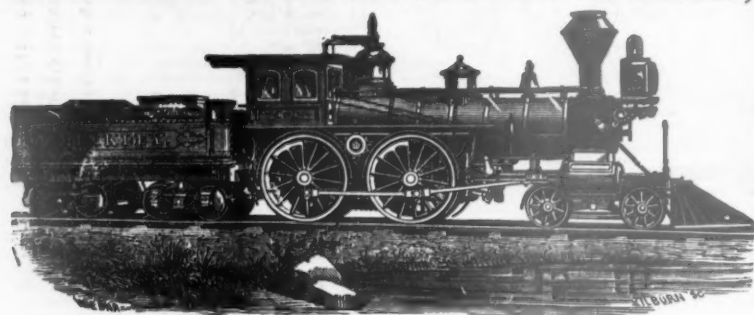


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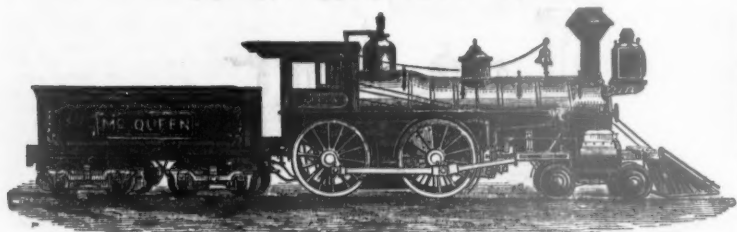
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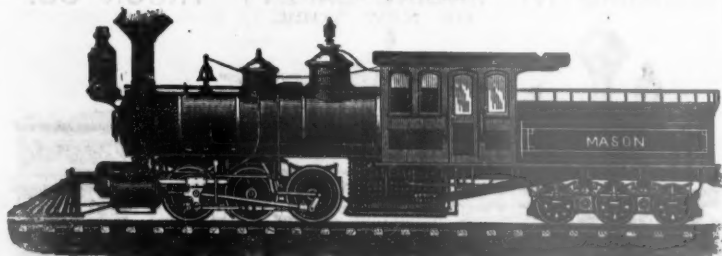
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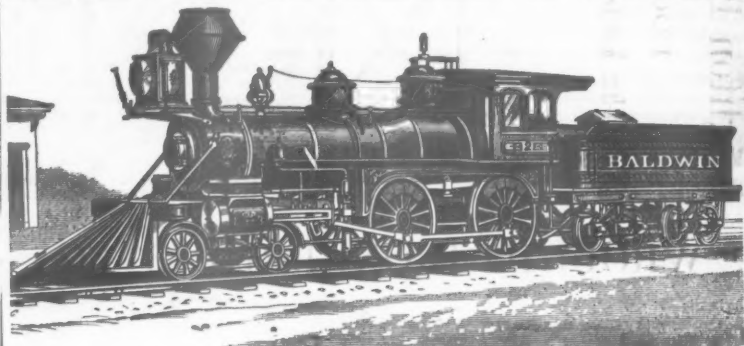
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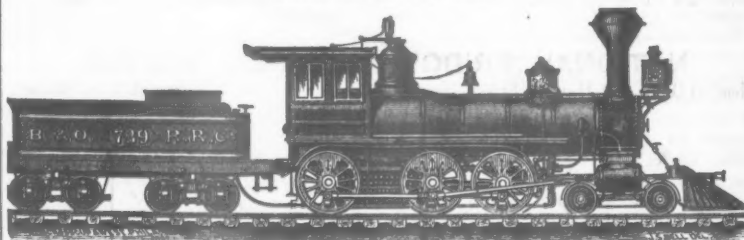
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